

FLORA OF PANAMA

BY
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PART III

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ORCHIDACEAE (P. H. Allen)
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FLORA OF PANAMA

Part III. Fascicle 4

ORCHIDACEAE¹

By PAUL H. ALLEN

39. CALANTHE R. Br.

CALANTHE R. Br. in Bot. Reg. 7: sub *t.* 573. 1821; Lindl. Gen. & Spec. Orch. Pl. 249. 1833; Benth. & Hook. Gen. Pl. 3:520. 1883.

Gbiesbreghtia A. Rich. & Gal. Ann. Sci. Nat. III, 3:28. 1845.

Erect terrestrial, or rarely epiphytic herbs, with leafy or sometimes pseudobulbous stems. Leaves few, broadly plicate, with prominent veins. In some of the Old World species the sheathing bases of the leaves envelop the angulate pseudobulbs, the leaf blades becoming deciduous at the end of the season's growth, while in other species the leaves persist for more than one year, with the pseudobulbs much reduced in size or entirely absent. In the single species known to occur in Panama, the two broadly plicate leaves are contracted below into a sheathing petiole arising directly from the rhizome and without any enclosed pseudobulb. Inflorescences erect, many-flowered racemes, equaling or exceeding the leaves in length, the basal portions enveloped by the sheathing leaf bases. Flowers small, on slender pedicels, subtended by linear bracts. Sepals free, subequal, spreading. Petals similar to the sepals or smaller. Lip 3-lobed, prolonged at the base into a spur, the claw of the lip connate to the column. Column short, erect, broadly winged at the apex, the base without a foot. Anther subterminal, operculate, incumbent, 2-celled; pollinia 8, waxy, elongate-pyriform, in groups of 4 in each cell of the anther.

A large genus of the Old World tropics, widely distributed in Africa, Asia and Oceania, with a single species in Central America and the West Indies.

¹ It is particularly desired to acknowledge the cooperation of Professor Oakes Ames of the Botanical Museum of Harvard University in affording the writer the unrestricted use of the Ames Orchid Herbarium and Library. The excellent illustrations by Mrs. Blanche Ames and by Mr. Gordon W. Dillon, used throughout the text, would not have been available without Professor Ames' permission. It is also desired to mention the active cooperation of Dr. Louis O. Williams in providing prompt determinations during the long period of field work in Panama, and, more recently, the very generous help of Mr. Charles Schweinfurth in the solving of many of the critical problems in the course of the preparation of the manuscript.

Issued March 21, 1949.



Fig. 148. *Calanthe mexicana*

(338)

1. *CALANTHE MEXICANA* Rchb. f. in *Linnaea* 18:406. 1844; *Xenia Orch.* 1:205, *t.* 79, *figs.* 1-3. 1856.

Gbiesbreghtia calanthoides A. Rich. & Gal. in *Ann. Sci. Nat.* III, 3:28. 1845.

Gbiesbreghtia mexicana A. Rich. & Gal. ex Rchb. f. *Xenia Orch.* 1:205. 1856, in synon.

Erect terrestrial herbs, 25-70 cm. tall. Leaves 2, broadly oblong-elliptic, acute, rather thinly plicate, 30-70 cm. long and 3-14 cm. broad, contracted at the base into a sheathing petiole, arising directly from the rhizome, the basal portions enclosed in 2-3 thin leafless bracts. Inflorescence an erect raceme equaling or exceeding the leaves in length, produced from between the sheathing leaf bases. Flowers few to many, small, white, pedicellate, subtended by linear acuminate bracts 8-20 mm. long and 1-2 mm. broad. Sepals white, free, subequal, spreading, ovate, acute, 7-10 mm. long and 3-6 mm. broad. Petals white, free, spreading, obovate-lanceolate, obtuse, 5-6 mm. long and 2-3 mm. wide. Lip 3-lobed, 8-10 mm. long, prolonged at the base into a spur; lateral lobes erect, minutely puberulent, the upper margins parallel with the column; frontal lobe spreading, yellow, minutely puberulent, subrotund, shortly apiculate, 3-4 mm. long. Ovary puberulent. Capsule ellipsoidal, 2.5-3 cm. long and 1-2 cm. wide.¹

Mexico, Guatemala, Costa Rica, Panama, and the West Indies.

CHIRIQUÍ: Upper Río Chiriquí Viejo, about 5000-6000 ft., *Seibert* 171; vic. Casita Alta, Volcán de Chiriquí, 1500-2000 m., *Woodson, Allen & Seibert* 825; Finca Lérída to Peña Blanca, 1750-2000 m., *Woodson & Schery* 303; ridges south of Finca Lérída to Loma Sardina, 6000-7000 ft., *Allen* 4758; rain forest, Volcán de Chiriquí, 8000 ft., *Davidson* 934; Bajo Chorro, 7500 ft., *Davidson* 203; Cerro Punta, 2000-2500 m., *Allen & Fairchild* 3517.

A frequent and attractive terrestrial species in the bamboo-oak zone of the upper slopes of Chiriquí Volcano.

40. *BLETIA* Ruiz & Pavon

BLETIA Ruiz & Pavon, *Fl. Peruv. & Chil. Prodr.* 119, *t.* 26. 1794; Benth. & Hook. *Gen. Pl.* 3:513. 1883.

Gyas Salisb. in *Trans. Hort. Soc. Lond.* 1:299. 1812.

Bletiana Raf. in *Amer. Monthly Mag.* 4²:268. 1818, nomen.

Tbiehautia Colla, *Hort. Ripul.* 139. 1824.

Jimensia Raf. *Fl. Tellur.* 4:38. 1836.

Regnellia Barb. Rodr. *Gen. et Spec. Orch.* Nov. 1:81. 1877.

Bletilla Rchb. f. in *Fl. des Serres* 8:246. 1853.

Erect terrestrial herbs, with a few long, lanceolate, plicate, ultimately deciduous leaves which are contracted at the base into a sheathing petiole arising from the apex of a subglobose or sometimes more or less flattened, corm-like pseudobulb considerably resembling that of a *Gladiolus*. Inflorescences slender, erect, leafless scapes, equaling or exceeding the leaves in length, the basal portion either pro-

¹Since all measurements have been taken from dried material, it is to be expected that fresh flowers will exceed these figures by at least a third.

duced from the sides of the corm or enveloped in the sheathing leaf bases, the upper portion racemose or sometimes paniculate. Flowers of moderate size or small. Sepals free, subequal, spreading. Petals subequal to the sepals but usually broader. Lip entire or 3-lobed; the lateral lobes broad, usually rounded, erect, in natural position parallel to the column, or sometimes with lobulate, spreading apices; mid-lobe of the lip spreading, with or without an isthmus, the apex often crisped and reflexed, retuse or 2-lobed; the disk with 5-7 more or less fleshy, longitudinal crests or keels. Column elongate, semi-terete, arcuate, the apex winged and the base auriculate. Anther operculate, incumbent, 2-celled; pollinia 8, waxy, flattened, obovate or roughly triangular in outline.

A seemingly natural but perplexing genus in need of revision, now embracing about 50 species distributed from Florida and the West Indies to Mexico and Central and South America as far as Argentina, with three or four species described from the Old World tropics. It seems probable that careful comparison of available material would reduce this list to about a dozen valid species, some of which evidently are widely distributed.

- | | |
|--|----------------|
| a. Inflorescence enveloped by the sheathing leaf bases. Flowers about 3 cm. long, produced during the rainy season (summer). Highland species..... | 2. B. REFLEXA |
| aa. Inflorescence not enveloped by the sheathing leaf bases. Flowers about 1.5 cm. long, produced during the dry season (winter). Lowland species..... | 1. B. PURPUREA |

1. *BLETIA PURPUREA* (Lam.) DC. in Mem. Soc. Phys. Hist. Nat. Genève 9:97, 100. 1841; Huit. Not. Pl. Rar. 23. 1841.

Limodorum purpureum Lam. Encycl. Meth. Bot. 3:515. 1791.

Limodorum verecundum Salisb. Prodr. Stirp. 9. 1796.

Bletia verecunda R. Br. in Ait. Hort. Kew. ed. 2, 5:206. 1813.

Bletia pallida Loddiges, Bot. Cab. 7: t. 629. 1822.

Erect terrestrial herbs with 1-4 lanceolate, ultimately deciduous leaves 30-70 cm. long and 0.6-4.8 cm. wide, which are contracted below into a sheathing petiole arising from a subglobose or flattened corm-like pseudobulb 2.5-3 cm. in diameter. Inflorescence a slender, erect raceme or panicle, the degree of development depending on the strength of the individual plant, the scape produced from the side of the corm and equaling or exceeding the leaves in length, sometimes flowering after the leaves have fallen. Flowers few to many, rosy purple. Sepals free, subequal, spreading, 1.6-1.8 cm. long and .6-.7 cm. wide, the dorsal sepal ovate-lanceolate, acute, the laterals somewhat oblique at the base, ovate, acute. Petals subequal to the sepals, 1.5-1.7 cm. long and .6-.7 cm. broad, obovate, acute. Lip 3-lobed, about equaling the petals in length, the lateral lobes erect and paralleling the column in natural position, the frontal lobe extended, spreading, more or less crisped and reflexed, the apex bilobed, the inner lip with 7 erect, yellow, parallel, longitudinal, fleshy keels, only 5 of which extend to the frontal lobe. Column slender, arcuate, the apex winged, the base auriculate.



Fig. 149. *Bletia purpurea*
(341)

Mexico, Guatemala, British Honduras, Honduras, Costa Rica, Panama, Colombia, Venezuela, and the West Indies.

PANAMÁ: foothills east of Panama City, sea level, *Powell 45*; vic. San Carlos, on walls of river canyons, 0-10 m., *Allen 1149*; along Río Tecúmen, north of Chepo road, about 30 m., *Hunter & Allen 214*; Perlas Archipelago, San José Island, sea cliffs at East Bay, *Johnston 567*; Icacó Island, top of large rocks near coast, *Johnston 922*. COCLÉ: El Valle, banks of Río Antón, 600 m., *Allen 2766*; Río Mata Ahogado, region southeast of El Valle, 200 m., *Allen 3820*; vic. El Valle, *White & White 69*.

A very common and attractive species of the lowlands of the dry Pacific slope, where it is found from sea level to about 3000 ft. elevation, being frequently seen on the nearly vertical walls of the river canyons and in rocky places. The relatively small but brightly colored flowers are produced during the dry season (winter) after the corms have matured and usually after the leaves have fallen.

2. *BLETIA REFLEXA* Lindl. in Bot. Reg. 21: t. 1760. 1835.¹

Limodorum Lankesteri Ames & Schweinf. in Sched. Orch. 10:78. 1930.

Bletia Lankesteri Ames, Hub. & Schweinf. in Bot. Mus. Leaf. Harv. Univ. 3:41. 1934.

Erect terrestrial herbs with 2-3, usually linear-lanceolate, acuminate, plicate, strongly veined leaves which are ultimately deciduous. Leaves 25-60 cm. long and 0.8-2.5 cm. wide, the basal portions contracted into a sheathing petiole enveloped in 2-3 short, tubular, leafless bracts which are produced from the apex of a short, subconic, corm-like pseudobulb averaging about 1.5 cm. in diameter. Inflorescences erect, the basal portions enclosed in the sheathing leaf bases, the terminal portion an unbranched raceme equaling or exceeding the leaves in length. Flowers relatively large and conspicuous, in our specimens described as being purplish rose, produced on slender pedicels subtended by ovate, acuminate bracts. Sepals free, spreading, subequal, lanceolate, acute, 3-3.2 cm. long and .7-.9 cm. wide, the dorsal usually somewhat narrower. Petals subequal to the dorsal sepal, oblanceolate, acute, 3-3.5 cm. long and about .7 cm. wide. Lip 3-lobed, about 3 cm. long and 2-2.2 cm. wide when spread out, the lateral lobes rounded, erect in natural position, the mid-lobe entire, obtuse, spreading, about 8 mm. long and 8 mm. wide. Inner lip (disk) with 5 fleshy longitudinal crests. Column slender, semi-terete, 2.3-3 cm. long, somewhat dilated at the apex.

Mexico, Guatemala, Costa Rica, and Panama.

CHIRIQUÍ: Llanos del Volcán, 1120-1200 m., *Seibert 328*.

¹It seems possible that this species may be that originally described as *Bletia campanulata* Llave & Lex. (in Nov. Veg. Descr. Fasc. 2:17. 1825), but the description as given is obscure, and seemingly the type no longer exists. The present material shows rather marked differences from the 'Botanical Register' plate of *Bletia reflexa*, particularly in the shorter central lobe. However, since *Bletia Lankesteri* is about intermediate in this character between our specimens and the typical *Bletia reflexa*, it seems likely that both represent local forms of a widely distributed, somewhat polymorphic species.

41. CHYSIS Lindl.

CHYSIS Lindl. in Bot. Reg. 23: t. 1937. 1837; Benth. & Hook. Gen. Pl. 3:514. 1883.

Thorvaldsenia Liebm. in Bot. Not. 103. 1844.

Epiphytic herbs with fleshy, fusiform or clavate, often more or less pendent, pseudobulbous stems. Leaves broadly plicate, the sheathing bases enveloping the pseudobulbs, the leaf blades becoming deciduous at the end of the current season's growth. Inflorescences usually solitary, produced from the axils of one of the lower bracts of the flush of leafy new growth, the scape terminating above in a short, few-flowered raceme. Flowers relatively large and conspicuous. Sepals subequal, free, spreading, the dorsal sepal erect, the broader lateral sepals oblique and adnate to the foot of the column. Petals free, subequal to the sepals, but usually narrower. Lip fleshy, 3-lobed, the lateral lobes rounded or falcate, erect in natural position, or converging over the column, the mid-lobe erect or reflexed, often more or less 2-lobed or emarginate; disk with 3 to 5 longitudinal fleshy crests. Column short, erect, arcuate, broadly winged or roughly triangular in cross-section, produced at the base into a foot. Anther subrotund, operculate, incumbent; pollinia 8, waxy, oblong-ovoid, 4 in each cell of the anther.

Examination of available material in the Ames Herbarium and the Herbarium of the Missouri Botanical Garden would indicate that the genus is probably limited to two somewhat variable species differing fundamentally in the number of fleshy crests of the disk and in the frontal margin of the mid-lobe of the lip. The known geographic range is from Mexico to Peru and Venezuela. A small-flowered, richly colored variety of one of these species is known in Panama from a single collection of flowering material made by Mr. C. W. Powell. Although a few subsequent, sterile specimens have been seen in the field by the writer, it is to be considered as one of the local rarities.

1. CHYSIS AUREA Lindl. var. MACULATA Hook. in Bot. Mag. t. 4576. 1851.

Epiphytic herbs, with fleshy cylindric, fusiform or clavate, pendent pseudobulbs 15-20 cm. long and 1-2 cm. wide. Leaves plicate, lanceolate, acute or acuminate, 6-40 cm. long and 1.2-3.5 cm. wide, the imbricating bases persistent, enclosing the pseudobulbs, the blades ultimately deciduous. Inflorescences usually solitary, short racemes produced from the axils of one of the bracts of the leafy new growth. Flowers 3-7, 2.5-3 cm. long in dried specimens but probably somewhat larger when fresh. Dorsal sepal free, erect, elliptic-oblong, obtuse, 2-2.2 cm. long and 1.2-1.5 cm. wide, lateral sepals obliquely cuneate, 2.2-2.5 cm. long and 1.6-1.8 cm. broad, connate at the base and adnate to the column foot, form-



Fig. 150. *Chysis aurea* var. *maculata*

ing a rounded mentum. Petals obovate-lanceolate, acute, 2-2.2 cm. long and 0.9-1.1 cm. broad. Lip 3-lobed, the lateral lobes subfalcate, obtuse, erect, the apices somewhat convergent, the mid-lobe rounded in general outline, more or less cymbiform, the apex 2-lobed or emarginate; disk with 5 fleshy, longitudinal crests. Column short, stout, broadly winged, 0.9-1.0 cm. long and 0.9-1.0 cm. broad at the base, which is produced into a foot.

Costa Rica, Panama, and Colombia.

PANAMÁ: near Arraiján, west of the Canal, about sea level, Powell 309.

Chysis aurea var. *maculata* differs from the type in the smaller, more richly colored flowers. The sepals and petals are described as tan, often shaded purple. Lip yellow, the mid-lobe purple, with paler markings.

42. BULBOPHYLLUM Thou.

BULBOPHYLLUM du Petit-Thouars, Hist. Pl. Orch. Iles Aust. d'Afr., Tabl. des Espéc. III, t. 93-110. 1822; Benth. & Hook. Gen. Pl. 3:501. 1883.

Didactyle Lindl. in Fol. Orch. 1:57. 1852.

Bolbophyllaria Rehb. f. in Bot. Zeit. 10:934. 1852.

Epiphytic herbs, with short, subconic or angulate, 1- to 2-leaved pseudobulbs often widely spaced along a creeping rhizome. Inflorescences erect or arching spikes or racemes produced from the base of the pseudobulbs. Flowers numerous, inconspicuous, subtended by a bract, free on short pedicels or sessile in shallow pits on the fleshy peduncle. Sepals free, or the laterals connate and obliquely dilated at the base, adnate to the foot of the column. Petals smaller than the sepals, with entire or ciliate margins. Lip simple, fleshy, or with a thickened basal callus, contracted at the base and hinged to the column foot. Column short, erect, produced at the base into a foot. Anther terminal, operculate, incumbent, depressed-hemispherical or obtusely conical, usually 2 celled; pollinia normally 4, waxy, in pairs in the cells of the anther.

There is an extensive list of additional generic synonyms which are not cited because they apply to Old World members of the genus. Since nearly the entire genus is of Old World tropical distribution, where it attains a polymorphic development similar to that of *Epidendrum* in the Americas, it seems futile to attempt a generic description here which will cover the maximum possible limits of floral and vegetative structure. The few species found in the American tropics bear little resemblance to their Old World relatives, and might, for all practical purposes, be separated; but in this case, as in many others, it seems best to follow established usage. The description as given here is intended only to cover the two Panama species, which are identical in superficial appearance, but differ markedly in the size and shape of the petals, and to a lesser extent in the size and form of the lip.

- a. Petals acuminate to aristate, exceeding the length of the column; nearly equaling the sepals..... 1. *B. ARISTATUM*
 aa. Petals obtuse, scarcely equaling the length of the column, less than half the length of the sepals..... 2. *B. PACHYRRHACHIS*

1. *BULBOPHYLLUM ARISTATUM* (Rchb. f.) Hemsl. Biol. Centr.-Amer. Bot. 3:213. 1883.

Bolbophyllaria aristata Rchb. f. Beitr. Orch. Centr.-Amer. 60. 1861.

Epiphytic herbs 10–35 cm. tall, with short, subpyramidal, angulate pseudobulbs 2.5–5 cm. long and 1–2 cm. wide, usually spaced at intervals along the creeping rhizome. Leaves 2, linear-lanceolate, acute, coriaceous, 6–25 cm. long and 1.5–3 cm. wide. Inflorescences erect racemes 10–40 cm. tall, from the base of the pseudobulbs. Flowers inconspicuous, nearly sessile, subtended by a bract which nearly equals the flower in length. Dorsal sepal free, concave, ovate, acuminate, papillose on the outer surface, 5–6 mm. long and 1.5–2 mm. wide, lateral sepals ovate, acuminate, papillose on the outer surfaces, 4–5 mm. long and 1.5–2 mm. broad, connate at the base and adnate to the foot of the column. Petals lanceolate, acuminate to aristate, 4–7 mm. long and 1.5–3 mm. wide. Lip very fleshy, entire, obtuse, linguiform, 2 mm. long and 1–1.5 mm. wide, hinged to the column foot. Column very short, 1.5–2 mm. long, with two apical, lateral, denticulate processes, the base produced into a foot.



Fig. 151.
Bulbophyllum
 petals: 1, of *B.*
aristatum, 2, of
B. pachyrrhachis

Mexico, Guatemala, Honduras, Costa Rica, and Panama.

PANAMÁ: foothills east of city, sea level, *Powell s. n.*; San Juan Range, sea level, *Powell 3492*. COCLÉ: south rim of El Valle de Antón, 650 m., *Allen 2915*; El Valle, lower valley and marshes along Río Antón, about 500 m., *Hunter & Allen 375*. CHIRIQUÍ: Jaramillo, 4500 ft., *Davidson 1270*.

2. *BULBOPHYLLUM PACHYRRHACHIS* (Rchb. f.) Griseb. Fl. Brit. W. Indies, p. 613. 1864 (as *Bolbophyllum prachyrrhachis*).

Bolbophyllaria pachyrrhachis Rchb. f. in Walp. Ann. 6:241. 1861.
Bulbophyllum vinosum Schltr. Beih. Bot. Centralbl. 36²:411. 1918.

Epiphytic herbs 10–45 cm. tall, with short, subconical, strongly 4-angulate pseudobulbs relatively widely spaced along a creeping rhizome. Leaves 2, linear-lanceolate, acute or acuminate, 7–20 cm. long and 0.8–2.4 cm. wide. Inflorescence erect or arching from the base of the pseudobulbs, 10–45 cm. tall, the apical flowering portion of the peduncle often fleshy. Flowers small and inconspicuous, sessile in shallow pits on the peduncle, subtended by broadly triangular bracts. Dorsal sepal free, concave, ovate-acute, 4–5 mm. long and arching over the column, the laterals ovate-acuminate, 4 mm. long and 1.5 mm. broad, connate at the base and adnate to the foot of the column. Petals scarcely equaling the column and less than $\frac{1}{3}$ the length of the sepals, oblong-elliptic, obtuse. Lip entire, very



Fig. 152. *Bulbophyllum pachyrrhachis*
(346)

fleshy, more or less 3-angled in cross-section, linguiform, the apex obtuse, contracted at the base, and articulated to the column foot.

Mexico, Guatemala, Honduras, Costa Rica, Panama, and the West Indies.

CANAL ZONE: near Frijoles, sea level, *Powell* 364; along Las Cruces trail, between Ft. Clayton and Corozal, *Standley* 29102; foothills east of city, sea level, *Powell* s.n. PANAMÁ: drowned forest of Quebrada Ancha, Madden Lake region, 70 m., *Steyermark* & *Allen* 17104. VERAGUAS: Río de Jesús, sea level, *Allen* 4243.

43. EULOPHIA R. Br.

EULOPHIA R. Br. in Bot. Reg. 8: t. 686. 1823; Benth. & Hook. Gen. Pl. 3:535. 1883.

Cyrtopera Lindl. in Wallich, Numer. List, n. 7362-64. 1832; Gen. & Sp. Orch. Pl. 189. 1833.

Erect, terrestrial herbs with lanceolate, plicate, ultimately deciduous leaves, the basal portions contracted into a sheathing petiole arising from the apex of the short, subconical, tuber-like pseudobulb. Inflorescence an erect, leafless raceme, produced from the base of the tuber-like pseudobulb, equaling or exceeding the leaves. Flowers few to many. Sepals free, subequal, the laterals adnate to the foot of the column. Petals subequal to the sepals, but narrower. Lip 3-lobed, the rounded, lateral lobes erect and converging over the column, the mid-lobe erect or recurved, sometimes 2-lobed, base of the lip produced into a saccate mentum continuous with the foot of the column. Column short, produced at the base into a foot. Anther terminal, operculate, incumbent. Pollinia 2-4, waxy.

A large genus of mainly Asiatic and African plants represented in Panama by a single species. There seems no point in citing here the extensive list of generic synonyms applicable only to the Old World plants.

1. EULOPHIA ALTA (L.) Fawc. & Rendle, Fl. Jam. 1:112, t. 22, figs. 4-8. 1910.

Limodorum altum L. Syst. ed. 12, 2:594. 1767.

Dendrobium longifolium HBK. Nov. Gen. et Sp. 1:360. 1815.

Cyrtopodium Woodfordii Sims, in Bot. Mag. t. 1814. 1816.

Cyrtopera Woodfordii Lindley, Gen. & Sp. Orch. Pl. 189. 1833.

Cyrtopera longifolia Rchb. f. in Walp. Ann. 6:668. 1861.

Eulophia Woodfordii Rolfe, in Fl. Trop. Afr. 7:68. 1897.

Eulophia longifolia (HBK.) Schltr. Die Orchideen, p. 347. 1914.

Erect terrestrial herbs with thickened, tuberous rhizomes usually made up of roughly triangular, subconic, corm-like annual sections. Leaves several, erect, lanceolate, acuminate, plicate, strongly veined, ultimately deciduous, 60-120 cm. long and 2-10 cm. wide, contracted below into a cylindric leafy petiole, the broad bases enveloping the corm-like pseudobulb. Inflorescences erect, lateral, leafless scapes, produced from the base of the corm, terminating in a raceme 70-100 cm. tall. Flowers many, of moderate size. Sepals free, erect, subequal, lanceolate to oblanceolate, acute, 2-2.5 cm. long and 0.7-0.8 cm. wide, the laterals adnate at

Fig. 153. *Eulophia alta*

(348)

the base to the column foot. Petals erect, oblong, obtuse, subequal to the sepals, 1.5–1.7 cm. long and 0.7–0.8 cm. broad. Lip 3-lobed, lateral lobes rounded, erect, the apices spreading, mid-lobe entire, usually reflexed, with numerous minutely denticulate longitudinal nerves; disk with 2 erect, alate processes, the base subsaccate, forming a rounded mentum with the foot of the column. Column winged, arcuate, 0.8–1.0 cm. long, produced at the base into a foot.

Florida, Mexico, British Honduras, Guatemala, Panama, the West Indies, Colombia, Venezuela, Peru, and Brazil.

PANAMÁ: Mata Redonda, sea level, *Powell 3442*; hills and valleys east of city, sea level, *Powell 10*; vic. La Chorrera, sea level, *Allen 2080*. COCLÉ: vic. El Valle de Antón, 600 m., *Allen 1988*.

Rather frequent terrestrial plants found in areas of wet savanna and along roadways, sometimes persisting in vacant lots in Panama City. The leaves are reminiscent of those of *Bletia* or *Peristeria*. The sepals and petals are green or greenish tan, the lip variously shaded with rose or purple.

43-A. CYRTOPODIUM R. Br.¹

CYRTOPODIUM R. Br. in Ait. Hort. Kew., ed. 2, 5:216. 1813; Benth. & Hook. Gen. Pl. 3:541. 1883.

Tylocbilus Nees in Verh. Bot. Gart. Berlin 8:194, t. 3. 1832.

Epiphytic or semi-terrestrial herbs with stout, cylindric or fusiform pseudobulbs. Leaves broadly plicate, strongly veined, more or less distichous, the imbricating bases enclosing the pseudobulb, the blades ultimately deciduous. Inflorescences erect, leafless scapes from the base of the pseudobulbs, racemose or paniculate, equaling or exceeding the leaves. Sepals subequal, free, spreading, the laterals often broader and more or less adnate to the foot of the column. Petals subequal to the sepals but usually broader. Lip 3-lobed, the laterals rounded, erect, parallel with the column or the apices spreading, the mid-lobe entire, retuse or crisped, with a fleshy basal crest, the base adnate to the column foot. Column short, subterete, arcuate, produced at the base into a foot. Anther operculate, imperfectly 2-celled; pollinia 2–4, waxy.

A small genus of American orchids represented in Panama by a single species.

1. CYRTOPODIUM PUNCTATUM (L.) Lindl. Gen. & Spec. Orch. Pl. 188. 1833.

Epidendrum punctatum L. Syst. Nat. 2:1246. 1760.

Cymbidium trinerve Meyer, Prim. Fl. Essequib. 258. 1818.

Epidendrum gigas Velloso, Fl. Flum. Ic. 9: t. 20. 1827.

Cyrtopodium Willmorei Knowles & Westcott, Fl. Cab. 1: t. 4. 1837.

Oncidium palmophilum Mart. Herb. ex Lindl. Sert. Orch. sub t. 12. 1838.

Cyrtopodium speciosissimum Hort. ex Du Buysson, L' Orchid. 299. 1878.

Cyrtopodium tigrinum Linden, Ill. Hort. 28:95. 1881, nomen tantum.

Cyrtopodium Saintlegerianum Rchb. f. in Flora 68:301. 1885.

Cyrtopodium punctatum var. *Saintlegerianum* Hort. in Stein's Orchideenbuch, p. 181. 1892.

¹The genus *Cyrtopodium* was unrecorded from Panama when the generic key was written.



Fig. 154. *Cyrtopodium punctatum*

Robust, epiphytic or semi-terrestrial herbs with stout, fusiform pseudobulbs 12-40 cm. long and 2-6 cm. wide, the old pseudobulbs naked or enclosed in the imbricating, persistent leaf bases which are armed at the apex with stout, sharp spines. Leaves linear-lanceolate, acute or acuminate, plicate, distichous, strongly veined, 30-120 cm. long and 2-7.5 cm. wide. Inflorescence a lateral leafless panicle from the base of the pseudobulb, 60-120 cm. tall, the bracts oblong-lanceolate, with undulate margins, resembling the sepals in color and markings. Flowers many. Sepals free, subequal, spreading, oblong-lanceolate, acute or apiculate with strongly undulate margins, greenish yellow spotted irregularly with reddish brown. Dorsal sepal 0.8-2.5 cm. long and 0.8-1.1 cm. wide, lateral sepals 1.5-2 cm. long and 0.7-1.0 cm. wide. Petals free, spreading, obovate, obtuse or apiculate, yellow irregularly spotted red-brown, 1.5-2.0 cm. long and 0.9-1.2 cm. wide. Lip 3-lobed, the lateral lobes erect, more or less convergent over the column, rounded, usually exceeding the mid-lobe in size, reddish-brown shading to yellow at the base, mid-lobe strongly undulant, crisped, yellow, marked purple or reddish brown, crest tuberculate, verrucose, base of lip an oblong limb articulated with the column foot. Column short, arcuate, with a dorsal crest, dilated or semi-auriculate above, narrowed below, produced at the base into a foot.

Florida, Mexico, Guatemala, Costa Rica, the West Indies, Colombia, Venezuela, the Guianas, Brazil, Peru, Paraguay, and Argentina.

PANAMÁ: San José Island, Perlas Archipelago, sea level, *Walker s. n.* (under *Allen 3542*).

Mr. Walker describes the plants as forming colonies on rocks. Although widely distributed in the Americas this is the only known station for the species in Panama.

44. WARREA Lindl.

WARREA Lindl. in Bot. Reg. n. s. 6: Misc. 14. 1843; Benth. & Hook. Gen. Pl. 3:545. 1883.

Erect, terrestrial, highland herbs with lanceolate, acute or acuminate, plicate, strongly veined leaves contracted at the base into a short, stout, sheathing petiole, either with or without an enclosed, short, cylindric, tapering pseudobulb. Inflorescence an erect, leafless raceme produced from the axil of the lowest basal, petiolar bract. Flowers relatively large and conspicuous. Sepals subequal, concave, the bases of the laterals oblique and adnate to the column foot. Petals subequal to the sepals but usually broader. Lip entire, the lateral margins erect; apex spreading, emarginate, 2-lobed, obscurely apiculate or entire; disk lamellate; base of the lip adnate to the column foot. Column elongate, semiterete, with a short basal foot. Anther terminal, operculate, incumbent; pollinia 2 to 4, broadly semiglobose, waxy.

A small, poorly understood genus of American terrestrial orchids at present including about six described species and several varieties ranging from Costa Rica to Colombia, Venezuela, Brazil, and Peru. A single species is known to occur in Panama in the highlands of Chiriquí Province.

1. *WARREA COSTARICENSIS* Schltr. in Fedde Rep. Sp. Nov. 16:446. 1920.

Erect terrestrial herbs to 70 cm. tall. Leaves 25–60 cm. long and 4–7.5 cm. broad, contracted at the base into a short, stout, sheathing petiole. Inflorescences erect racemes, equaling or slightly exceeding the leaves, produced from the sheathing base of the leafy petiole. Flowers relatively large, reddish bronze, the lip lighter with reddish bronze markings. Dorsal sepal oblong-ovate, obtuse, concave, 3.2–3.5 cm. long and 1.5 cm. broad, lateral sepals subequal to the dorsal sepal, the bases oblique, forming a short rounded mentum with the foot of the column. Petals obovate, obtuse, oblique, 2.8–3 cm. long and 1.3–1.5 cm. wide. Lip entire, 2.5–3 cm. long, and 2.5–3 cm. wide, suborbicular when spread out; basal callus narrow, about 1.5 cm. long. Column slender, arcuate, 2.5 cm. long, produced at the base into a foot.

Costa Rica and Panama.

CHIRIQUÍ: Potrerillos, 3000 ft., *Kieswetter s. n.*; in heavy forest near Potrerillos, *Dunn s. n.*

The present specimens differ from typical material of *Warrea costaricensis* in the entire, not emarginate apex of the lip, and in other minor details. Schlechter's sketch, however, does not seem to agree entirely with his description, which is in some respects nearer to our plant. Since our specimens compare in general quite well with the Costa Rican material it is thought best to consider them as slight geographical variants of an identical species, at least pending more adequate collections upon which to base comparisons.

45. *GOVENIA* Lindl.

GOVENIA Lindl. in Lodd. Bot. Cab. 18: *t.* 1709. 1831; Benth. & Hook. Gen. Pl. 3:542. 1883.

Eucnemis Lindl. Gen. & Sp. Orch. Pl. 161. 1833.

Erect, terrestrial herbs, with 1 or 2 broadly plicate leaves, the basal portions forming a stout sheathing petiole and enclosing a short, stout, subconical tapering pseudobulb. Inflorescences erect, subcapitate or racemose, equaling or exceeding the leaves, the base enveloped by one of the leafless petiolar bracts. Flowers few to many, of small to medium size, borne on short or elongate pedicels, subtended by short or elongate bracts. Sepals subequal, connivent at the base, the dorsal sepal concave, erect, the laterals more or less falcate or decurved, adnate to the foot of the column, forming a mentum. Petals subequal to the lateral sepals. Lip entire, somewhat concave at the base, spreading, articulated to the foot of the column. Column arcuate, auriculate near the apex, or broadly winged throughout its

length; base produced into a short foot. Anther terminal, operculate, incumbent, 1-celled; pollinia 4, waxy.

A few American terrestrial orchids of remarkably uniform vegetative and floral structure. It seems evident that relatively trivial differences in size, color, length of the raceme, and geographic locality have been considered as adequate for the segregation of most of the so-called species. Only two entities showing any consistent structural differences are known to occur in Panama, where they seem to be confined to the Chiriquí highlands. The sterile plants greatly resemble those of *Calanthe mexicana*.

- a. Lip lanceolate, lateral margins minutely ciliate..... 1. *G. CILIILABIA*
 aa. Lip broadly ovate, lateral margins not ciliate..... 2. *G. LILIACEA*

1. *GOVENIA CILIILABIA* Ames & Schweinf. in Sched. Orch. 10:80. 1930.

Erect terrestrial herbs 30–36 cm. tall. Leaves 2, broadly plicate, elliptic, shortly acuminate, 30–36 cm. long and 5.5–9 cm. broad, contracted at the base into an elongate sheathing petiole enclosed by 2–3 obtuse or very shortly acute, tubular, imbricating bracts. Inflorescence erect, the sheathing petiole enclosing a slender raceme scarcely equaling the leaves. Flowers small for the genus, membranaceous. Dorsal sepal elliptic-oblong, acute, concave, 10–13 mm. long and 4.2–5 mm. broad, the lateral sepals obliquely elliptic-lanceolate, acute, 9.5–10.5 mm. long and 3.5–3.8 mm. wide. Petals oblique, subfalcate, acute, 10–11 mm. long and 5–5.2 mm. wide. Lip entire, oblong-lanceolate, with minutely ciliate margins; base articulated to the foot of the column. Column arcuate, fleshy, broadly winged, dilated above, 6–7 mm. long, produced at the base into a foot.

Costa Rica and Panama.

CHIRIQUÍ: vic. Casita Alta, Volcán de Chiriquí, 1500–2000 m., Woodson, Allen & Seibert 947.

The flowers of the single specimen bear the description: "yellow, purple striped; lip violet rose, with a white tip."

2. *GOVENIA LILIACEA* Lindl. in Bot. Reg. 21: t. 1795. 1836; 24: t. 13. 1838.

Govenia utriculata (Sw.) Lindl. in Bot. Reg. 25: Misc. 47. 1839.

Limodorum utriculatum Sw. Prodr. 119. 1788.

Cymbidium utriculatum Sw. in Nova Acta Soc. Sci. Upsal. 6:75. 1799.

Govenia Powellii Schltr. in Fedde Rep. Sp. Nov. 17:51. 1922.

Erect terrestrial herbs 45–65 cm. tall. Leaves 2, plicate, elliptic, shortly acute or lanceolate-acuminate, contracted at the base into a sheathing petiole, the bases enclosing a short, stout, fleshy, cylindric, tapering pseudobulb. Inflorescences erect, leafless scapes, racemose or subcapitate, less than, equal to, or exceeding the leaves, the bases enveloped by the tubular imbricating petiolar bracts. Flowers few to many. Dorsal sepal lanceolate, shortly acuminate, 10–16 mm. long and 4–5 mm. broad, lateral sepals oblique, lanceolate, subfalcate, acute, 8–11 mm. long and 4–5 mm. wide. Petals oblanceolate, acute, 10–11 mm. long and 5–6 mm. wide. Lip entire, broadly ovate, acute, 6–9 mm. long and 4.5–7.5 mm. broad, strongly

nerved, the nerves often branching; base articulated to the column foot. Column short, arcuate, 7-8 mm. long, broadly winged and often subauriculate at the apex, produced at the base into a foot.

Mexico, Guatemala, Salvador, Honduras, Costa Rica, Panama, the West Indies, Venezuela, Brazil, Argentina, and Bolivia.

CHIRIQUÍ: in damp, shady places, 4000 ft., *Powell* 205; valley of the upper Río Gariché, 1050-1100 m., *Seibert* 329; Jaramillo, Boquete, 5000 ft., *Davidson* 798; Casita Alta to Cerro Copete, 2300-3000 m., *Woodson & Schery* 345; Volcán de Chiriquí, 8000 ft., *Davidson* 934, 946.

The last three specimens cited seem to show consistent differences from the rest in the longer racemes, the abundant linear bracts, and in the somewhat smaller flowers. In spite of this, however, no significant structural differences could be detected in the flowers. Under the circumstances it is considered best to include them here, at least until the genus as a whole is critically studied.

46. MORMODES Lindl.

MORMODES Lindl. *Introd. Nat. Syst. Bot.* ed. 2, 446. 1836; Benth. & Hook. *Gen. Pl.* 3:552. 1883.

Cyclosia Kl. in *Allgem. Gartenzeit.* 6:305. 1838.

Epiphytic herbs, with cylindric or fusiform pseudobulbs usually tapering uniformly upward. Leaves plicate, strongly veined, distichous, the unarmed imbricating bases enclosing the pseudobulbs; leaf blades deciduous. Inflorescences arching racemes produced from the base or lower sides of the pseudobulbs. Flowers few or many, often richly colored. Sepals free, subequal, spreading or strongly reflexed. Petals subequal to the sepals or sometimes broader. Lip entire or 3-lobed, often fleshy, the lateral lobes or margins usually strongly reflexed, base often with a claw which is adnate to the base of the column. Column usually curved and twisted to one side so that the dorsal surface of the apex rests against the lip, the anther and stigmatic surface being thus exposed; rostellum without antennae, base of the column without a foot. Anther terminal, operculate, incumbent. 1- or imperfectly 2-celled, extremely sensitive; pollinia 2 or 4, waxy, often ejected during the process of pressing the flowers and found adhering to the lip, or to one of the other floral parts.

An interesting genus of American epiphytic orchids, ranging from Mexico to Peru and Brazil, vegetatively reminiscent of *Catasetum*, but readily distinguishable even when not in flower by the absence of spines on the upper margins of the imbricating leaf bases enveloping the old pseudobulbs. Many species have been described, often founded on single specimens flowering in European greenhouses. Although many entities enter into the present confused picture, it seems probable that most represent color forms of either *Mormodes igneus* or *M. atropurpureum*. In spite of this abundance of named color forms, valid diagnostic characters seem to exist, based mostly on the lobes in the lip, whether present or absent, and their

relative size, shape or indument. Although even these characters are subject to a certain amount of individual interpretation, four fairly well-marked entities can be separated in Panama. Due to the extreme torsion of all of the floral parts, it is generally necessary to spread the lip out fully to obtain any adequate idea of its shape.

- a. Lip distinctly 3-lobed, about as long as broad; mid-lobe projecting conspicuously beyond the laterals, the apex sometimes recurved..... 1. *M. ATROPURPUREUM*
- aa. Lip entire, or of two lateral lobules with a shortly apiculate apex.
 - b. Blade of lip elliptic-ovate to rhombic-ovate, acute or acuminate, not abruptly apiculate, about twice as long as broad..... 2. *M. COLOSSUS*
 - bb. Blade of lip obovate, oval or suborbicular, obtuse, or truncate, abruptly apiculate, about as long as broad.
 - c. Lip glabrous..... 4. *M. IGNEUM*
 - cc. Lip pubescent..... 3. *M. HOOKERI*

1. *MORMODES ATROPURPUREUM* Lindl. Introd. Nat. Syst. Bot., ed. 2, 446. 1836, non Hook.

Epiphytic herbs with very stout pseudobulbs. Inflorescences erect racemes, produced from near the base of the pseudobulbs. Sepals subequal, free, spreading, lanceolate, acute or acuminate, the dorsal sepal 2.4–2.6 cm. long and .6–.7 cm. wide, laterals lanceolate, acute or acuminate, 2.6–2.8 cm. long and .7–.8 cm. wide. Petals elliptic-lanceolate, acute, 2.5 cm. long and .9–1.1 cm. wide. Lip distinctly 3-lobed, 1.8–2 cm. long and 1.8–2 cm. wide when spread out, the lateral lobes rounded and strongly reflexed, the entire mid-lobe projecting beyond the laterals, subcuneate, abruptly apiculate. Column twisted to one side. Flowers described as "red-brown, with small spots. Lip rose, spotted with red-brown."

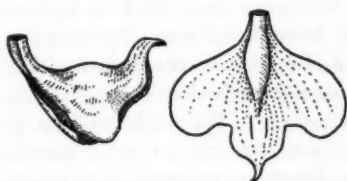


Fig. 155. *Mormodes atropurpureum*—lip

Costa Rica and Panama.

CHIRIQUÍ: Caldera River, 3500 ft., *Powell s. n.*; Concepción, 800 ft., *Powell s. n.*; vic. Progreso, 1000 ft., *Dunn s. n.*

Seemingly rare. Most of the specimens previously determined as *Mormodes atropurpureum* Lindl. are dark red color forms of *M. igneum*.

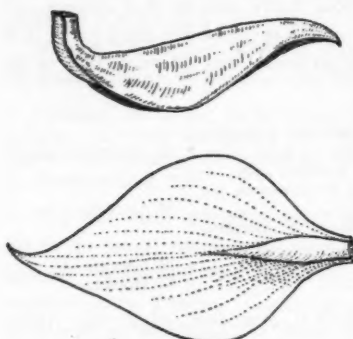
2. *MORMODES COLOSSUS* Rchb. f. in Bot. Zeit. 10:636. 1852.

Mormodes macranthum Lindl. & Paxt. in Paxton's Flow. Gard. 3:98. 1852–53.

Mormodes Wendlandii Rchb. f. in Walp. Ann. 6:581. 1861.

Mormodes Powellii Schltr. in Fedde Rep. Sp. Nov. 17:55. 1922.

Epiphytic herbs. Pseudobulbs often long, cylindric, tapering. Leaves plicate, deciduous, the persistent imbricating bases unarmed. Inflorescences long arching racemes produced from near the base of the pseudobulbs. Sepals subequal, spreading, linear-lanceolate, acuminate, 3.5–5 cm. long and .6–.8 cm. wide. Petals subequal to

Fig. 156. *Mormodes colossus*—lip

the sepals, lanceolate, acuminate, 3.2–4.5 cm. long and .7–1.0 cm. wide. Lip elliptic-ovate to rhombic-ovate, acute or acuminate, 3.2–5 cm. long and 1.6–2.5 cm. wide when spread out, the lateral margins often strongly recurved, dried specimens frequently giving the impression of being linear-lanceolate; base shortly clawed. Column 1.5–1.7 cm. long, twisted to one side, typical of the genus.

Costa Rica and Panama.

CANAL ZONE: Gatún Lake and Río Chagres, sea level, *Powell s. n.*; Ana Lago, sea level, *Powell s. n.*; Gatún Lake, *Powell s. n.*; upper Chagres region, *Powell s. n.* COCLÉ: vic. El Valle de Antón, 800–1000 m., *Allen 76*; El Valle, *Cope s. n.*, *Fairchild s. n.*

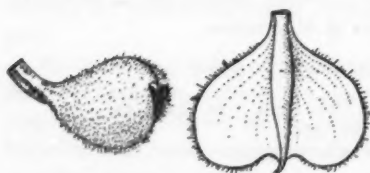
There seem to be no consistent structural differences upon which to separate *M. macrantum*, *M. Wendlandii* or *M. Powellii* from *M. colossus*. The species is somewhat variable, particularly in the size and coloration of the flowers. They are variously described in Panama as with "Sepals and petals olive green, yellowish brown or cream. Lip brown, tan or yellow. Fragrant." The specimens from El Valle de Antón are smaller than typical *M. colossus*, and the lip rather broader near the base when spread out, but both these differences represent deviations in degree rather than in the presence or absence of any essential character.

3. *MORMODES HOOKERI* Lem. Jard. Fleur. 1: Misc. 116. 1851–54.

Mormodes atro-purpurea Hook. in Bot. Mag. t. 4577. 1851, non Lindl.

Mormodes barbatum Lindl. & Paxt. in Paxton's Flow. Gard. 2:57. 1851–53.

Epiphytic herbs; pseudobulbs dwarf, in specimens seen about 8–10 cm. tall, otherwise typical of the genus. Leaves plicate, deciduous. Inflorescences short erect racemes from the base of the pseudobulbs. Flowers few to many, dark red-

Fig. 157. *Mormodes Hookeri*—lip

dish brown or red; if many, set closely together in a dense raceme. Sepals subequal, lanceolate, acuminate, strongly reflexed, dorsal sepal 1.8–2 cm. long and .45–.5 cm. wide, laterals 1.7–1.8 cm. long and .55–.65 cm. wide. Petals subequal to the sepals, lanceolate, acuminate, strongly reflexed, 1.6–1.8 cm. long and .55–.65 cm. wide. Lip obovate, truncate,

abruptly and minutely apiculate, about as long as broad when spread out, 1.4–1.6 cm. long and 1.4–1.6 cm. wide, lateral lobes very strongly reflexed, pubescent. Column twisted to one side, typical of the genus.

Panama and Costa Rica.

1949]

Although no herbarium material of this species is at present available from Panama, it appears in the 'Botanical Magazine' (*t.* 4577) under the erroneous name of *Mormodes atro-purpurea* Hook., with the notation that it had been obtained from one of the sales of Warscewicz's Panama plants. Also, a plant was flowered in the Missouri Botanical Garden collection in Balboa, C. Z. in 1940, having been collected in the vicinity of El Valle de Antón, in Coclé Province. Unfortunately these flowers were not preserved. The species is therefore listed without hesitation for our area, in spite of the lack of actual specimens. Schlechter's citation of *M. Hookeri* in Panama may probably be based on specimens in some European herbarium, but actually all specimens seen by the writer which had been determined by Schlechter as such are dark red color forms of *M. igneum*. Except for the pubescent lip and the dwarf habit, the species is not remarkably distinct from *M. buccinator*, and may, in fact, prove to be only a very distinct variety or geographical race.

4. *MORMODES IGNEUM* Lindl. & Paxt. in Paxton's Flow. Gard. 3:97, *t.* 93. 1852-53.

Epiphytic herbs. Pseudobulbs stout, cylindric, tapering uniformly from the base upward, 10-35 cm. tall and 1-5 cm. wide. Leaves 5-15, plicate, distichous, strongly veined, the persistent, closely imbricating, unarmed bases closely enveloping the pseudobulbs, the lanceolate, acuminate blades deciduous at the end of the growing season. Inflorescences 1 to several, erect, arching racemes produced in succession from near the base of the pseudobulbs. Flowers few to many, variable in color, size, and texture. Sepals subequal, membranaceous, yellow, olive-green, tan-brown or red, often with minute spots, the dorsal sepal erect, lanceolate, acuminate or apiculate, 1.8-2.8 cm. long and .5-.7 cm. wide, the laterals lanceolate, acuminate, strongly reflexed, 1.5-2.7 cm. long and .4-.7 cm. wide. Petals subequal to the sepals, similarly colored, elliptic-lanceolate, acute, usually strongly reflexed, 2-2.5 cm. long and .6-.8 cm. wide. Lip suborbicular when spread out, shortly apiculate, glabrous, usually fleshy to very fleshy, white, yellow, olive-green, tan, brown, or dark reddish brown, often with minute brown or reddish brown spots, the lateral margins strongly reflexed, the base conspicuously clawed. Column twisted to one side, typical of the genus.

Costa Rica, Panama, and Colombia.

CANAL ZONE: Gatún Lake, *Powell s. n.*; Frijoles, *Powell s. n.*; Las Cascadas, *Powell s. n.*
 PANAMÁ: San Juan, *Powell s. n.*; upper Chagres, *Powell s. n.*; foothills east of city, *Powell s. n.*; Río La Maestra, 0-25 m., *Allen 64*; Cerro Campana, 1000 ft., *Fairchild s. n.* COCLÉ: lower valley and marshes along the Río Antón, El Valle de Antón, 500 m., *Hunter & Allen 388*; hills south of El Valle de Antón, 700 m., *Fairchild s. n.*; floor of El Valle de Antón, 600 m., *Allen 3985, 5182*. VERAGUAS: vic. Santa Fé, 1000 ft., *Allen 4419*. CHIRIQUÍ: 800 ft., *Powell s. n.*; Caldera River, 3500-4000 ft., *Powell s. n.*

Fig. 158. *Mormodes igneum*

This is by far the most frequent species of *Mormodes* found in Panama, distributed throughout the lowlands of both coasts and ascending to about 4000 feet on the Pacific slope. The plants are frequently found growing in the tops of dead trees or on projecting dead branches, displaying a marked preference for decaying wood and exposure to full sun. The flowers are extremely variable in color and to a lesser degree in size and texture, scarcely any two being exactly alike.

47. CATASETUM L. C. Rich.

CATASETUM L. C. Rich. ex Kunth, Syn. Pl. Aequin. 1:330. 1822; Benth. & Hook. Gen. Pl. 3:551. 1883; Mansfeld, in Fedde Rep. Sp. Nov. 30:257-275. 1932; 31:99-125. 1932.

Myanthus Lindl. in Bot. Reg. 18: sub *t.* 1538. 1832.

Monacanthus Lindl. loc. cit. 1832.

Cuculina Raf. Fl. Tellur. 4:49. 1836.

Monacanthus G. Don. in Sweet, Hort. Brit. 3:644. 1839.

Catachaetum Hoffm. Verh. Orchid. 22. 1842.

Clowesia Lindl. in Bot. Reg. 29: Misc. 25, t. 39. 1843.

Warczewitzia Skinner in Lindl. & Paxton's Flow. Gard. 1:45. 1850-51.

Epiphytic herbs. Pseudobulbs fleshy, fusiform, or subconic; roots often with many secondary, slender, erect, spinous rootlets which form dense mats about the base of the plants. Leaves plicate, strongly nerved, the blades deciduous; the persistent imbricating bases closely enveloping the pseudobulbs, armed at the apex with short, sharp spines. Inflorescences arching or pendulous racemes from the base of the pseudobulbs. Flowers few or many, often large and showy, unisexual or perfect. Sepals and petals in all forms free, subequal, fleshy or membranaceous, part or all of them spreading or reflexed and connivent at the base. The genus is divided by Mansfeld into two distinct sections. In *CLOWESIA*: flowers perfect (containing both a functional stigmatic surface and a fertile anther); column without elongate antenna-like processes; lip membranaceous or fleshy. In *ORTHO-CATASETUM*: flowers unisexual, the staminate and pistillate forms strikingly dissimilar and usually produced on separate scapes; staminate flowers (those most frequently seen) usually many, often conspicuously colored, on an arching or pendent raceme; lip membranaceous, fleshy, spreading, concave or galeate, the margins entire, lobulate, emarginate, crenate, fimbriate or dentate; column erect, footless, the under-side usually with two elongate antenna-like processes which are extremely sensitive when touched, ejecting the pollinia with considerable force. Anther terminal, operculate, incumbent, convex, 1-celled or imperfectly 2-celled; pollinia 4, waxy, in 2 pairs, or 2-lobed or 2-sulcate. Pistillate flowers less frequently produced, usually few, on short, erect or arching racemes. Lip usually very fleshy and galeate, with or without a thickened margin. Column short and stout, without antennae; functional stigmatic surface present.

A large and remarkable genus of American orchids ranging from Mexico to Peru and Brazil. They are among the most interesting of all known orchids, but segregation of the various entities has been delayed and confused by the dimorphism of the flowers. Many synonymous names have been added to the literature from specimens flowering in European greenhouses, most being color forms of now well-known species. However, much remains to be done, and some instances still exist (in the section *ORTHO-CATASETUM*) where only the staminate, or the pistillate form is known, or at least the forms have not been correlated with each other. Both sections of the genus are represented in Panama, each with three species.

a. Flowers perfect. Column without elongate antennae. (Section *CLOWESIA*.)

b. Lip 3-lobed, membranaceous, apical lobe fimbriate..... 6. *C. WARCZEWITZII*

bb. Lip entire, very fleshy, apex obtuse or acute.

c. Sepals and petals very strongly reflexed. Apex of the lip acute.... 4. *C. SUAVE*

cc. Sepals and petals spreading. Apex of the lip obtuse..... 2. *C. EBURNEUM*

aa. Flowers dimorphic. Column of the staminate flowers (in the Panama species) with 2 elongate antennae. (Section *ORTHO-CATASETUM*.)

*The key in this section is based on staminate flowers. It is usually difficult or impossible to identify the pistillate flowers, particularly from dried material.

- b. Lip of the staminate flowers with 5 elongate, marginal processes.
Total length of the lip 1 cm. or less..... 1. *C. BICOLOR*
- bb. Lip of the staminate flowers without elongate marginal processes.
Total length 2 cm. or more.
- c. Lip globose above, with an abrupt, conical, basal constriction,
lateral margins minutely ciliate; inner lip strongly rugose-striate.... 5. *C. VIRIDIFLAVUM*
- cc. Lip obconic, uniformly tapering, the base not abruptly constricted,
lateral margins fimbriate; inner lip glabrous..... 3. *C. OERSTEDII*

1. *CATASETUM BICOLOR* Klotzsch, in Allgem. Gartenzeit. 22:337. 1854.

Catasetum gongoroides Kränzl. in Fedde Rep. Sp. Nov. 23:254. 1930.

Epiphytic herbs. Pseudobulbs dwarf, subconic or cylindric, tapering, 4–9.5 cm. long and 2.5–4 cm. wide. Leaves plicate, distichous, elliptic-lanceolate, acute or acuminate, the imbricating persistent bases enveloping the pseudobulbs, the old growth armed at the apex with sharp spines, the leaf blades deciduous at the end of the growing season. Flowers unisexual, dimorphic, produced on separate scapes. Staminate inflorescences arching or pendent racemes 8–15 cm. long, from the base of the pseudobulbs. Sepals subequal, free, lanceolate, acuminate, brownish green, purplish, flesh-pink or dark reddish brown, 2.5–4 cm. long and 2.8–3.2 mm. wide, dorsal sepal erect, laterals strongly reflexed or spreading, often more or less parallel with the elongate peduncle. Petals subequal to the sepals, elliptic-lanceolate, acute, pale green, purplish green, or flesh-pink, spotted red-brown, 2.5–3 cm. long and 4–5 mm. wide, erect and closely approximating the dorsal sepal, the three segments closely arching over the column. Lip short, the base saccate, the apex complexly 3-lobed; lateral lobes erect, 2 on each side, about equaling the saccate base in length, the upper pair linguiform, obtuse, the lower pair linear-lanceolate, acuminate; mid-lobe triangular, spreading, the entire lip including lobes 5–10 mm. long, white or pale yellow, the margins of the central lobe red-brown, the lateral lobes and inner surface of the saccate base also irregularly blotched red-brown. Column slender, erect, conspicuously rostrate at the apex, winged, 12–15 mm. long and about 4 mm. broad, under-surface with 2 elongate antennae, the points of which extend to the inner base of the saccate lip. Pistillate flowers relatively rare, produced on few-flowered, erect racemes 8–10 cm. tall, from the base of the pseudobulbs. Sepals free, subequal, spreading or reflexed, coriaceous, elliptic-lanceolate, acute, pale green, 2 cm. long and 4–6 mm. wide. Petals subequal to the sepals, spreading, coriaceous, elliptic-lanceolate, with oblique acute tips, green, minutely spotted red-brown, 2–2.3 cm. long and .6–.7 cm. wide. Lip fleshy, calceiform, yellowish green, 18–20 mm. long and 15 mm. wide, with an acute, thickened, broadly triangular apex. Column short, stout, broadly triangular in cross-section, 8 mm. long and 7 mm. wide, with a narrow, lunate functional stigmatic surface.

Panama and possibly Colombia.

Fig. 159. *Catasetum bicolor*

(361)

CANAL ZONE: Limon Island, vic. Nuevo Limon, Gatún Lake, 80 ft., *Cope & Babbitt s. n.*; Barro Colorado Island, *Zetek s. n.*; without definite locality, *Barrett s. n.* COLÓN: Cerro Santa Rita, 1200 ft., *Allen & Fairchild 5181*. CHIRIQÚI: Chiriquí Volcano, 3000–3500 ft., *Powell 168*.

Frequent plants of the upper slopes of the wet forested mountains of Colón Province, where they are usually found growing on old logs and stumps, showing a decided preference for dead and decaying wood. Also recorded from the slopes of Chiriquí Volcano, but not seen there in recent years. The plants when not in flower are almost identical in vegetative appearance with those of *Catasetum Warczewitzii*.

2. *Catasetum eburneum* Rolfe, in Kew Bull. 86. 1906.¹

Epiphytic herbs. Pseudobulbs cylindric, tapering, 5–8 cm. tall and 2–2.5 cm. wide. Leaves plicate, with 3 prominent veins, lanceolate, acuminate, 15–30 cm. long and 2–3.5 cm. wide; the persistent imbricating bases enveloping the old pseudobulbs, armed at the apex with sharp spines; the leaf blades ultimately deciduous. Inflorescence an arching raceme from the base of the pseudobulb, 18–30 cm. long. Flowers perfect, waxy white, the lip shaded and spotted yellow, fragrant. Sepals fleshy, subequal, free, spreading, or somewhat reflexed, oblong, obtuse, 1.7–2 cm. long and .8–1 cm. wide. Petals fleshy, spreading, ovate-elliptic, acute, 1.3–2 cm. long and 1–1.2 cm. wide. Lip entire, very fleshy, saccate, adnate to the base of the column, broadly ovate, obtuse; inner lip with two lateral erect ridges on either side of the basal concavity, terminating toward the apex in a low, emarginate, fleshy crest. Column very short, stout, terete, 8 mm. long and 8 mm. broad, without antennae. Anther with obtuse lateral lobules, the apex sagittate.

Panama and Colombia.

PANAMÁ: Cerro Campana, on low trees along margins of grassland, 2500 ft., *Allen 4559*.

A seemingly rare species, thus far known only from a few plants collected on the upper slopes of Cerro Campana where they were found on low trees on the margins of the extensive grasslands. Vegetatively they are reminiscent of immature plants of *C. viridiflavum*, but lack the erect, spinous, matted, secondary rootlets so characteristic of that species.

¹*Catasetum eburneum* is considered by Mansfield to be referable to the earlier *dilectum* Rehb. f. (Beih. Orch. Central-Amer. 73. 1866). However, careful comparison of our material with the Reichenbach description and drawing of the type in the Ames herbarium has disclosed wide discrepancies in nearly every essential structural detail. The description of *eburneum* by Rolfe, on the other hand, agrees with our specimens in almost every respect except that our flowers are somewhat smaller. Since our plant flowered in cultivation under somewhat abnormal conditions, some difference in size would be expected.

Fig. 160. *Catesetum eburneum*3. *CATASETUM OERSTEDII* Rchb. f. in *Bonplandia* 3:218. 1855.*Catesetum rostratum* Klinge, in *Acta Hort. Petropol.* 17:134, f. 2. 1898.*Catesetum Brenesii* Schltr. *Beitr. Orchk. Zentralam.* 2:136, 225. 1923.

Stout epiphytic herbs with fusiform pseudobulbs 8–30 cm. tall and 3.5–5 cm. wide; roots with many slender, erect, spinous secondary rootlets, forming a dense mat about the base of the plants. Leaves 5–12, plicate, strongly nerved, elliptic-

lanceolate, acute or acuminate, 15–60 cm. long and 3–12 cm. wide, the blades deciduous at the end of the growing season, the persistent imbricating bases enveloping the old pseudobulbs, armed at the apex with sharp spines. Inflorescences arching racemes 12–50 cm. long, produced from the base of the pseudobulbs. Flowers relatively large and conspicuous, unisexual, dimorphic, the staminate and pistillate forms produced on separate scapes. Staminate flowers those most frequently seen, few to many on an arching raceme. Sepals membranaceous, free, green, greenish brown or marked with purple or red-brown, the dorsal sepal concave, oblanceolate, curving over the column, acuminate, 3.5–4 cm. long and 1.2–1.4 cm. wide, the laterals spreading, more or less oblique, lanceolate, acuminate, 4–4.5 cm. long and 1.5–1.7 cm. wide when spread out, the margins often involute. Petals membranaceous, green or marked with purple or red-brown, elliptic-oblanceolate, obliquely acuminate, 3.5–4 cm. long and 1.8–2 cm. wide, the inner margins somewhat overlapping below the dorsal sepal, forming with it a concave trough under the column. Lip very firm and fleshy, obconic, uniformly tapering, 2.5–3.5 cm. long and 2–2.2 cm. wide, green, marked or spotted purple, red-brown, or yellow, glabrous on the outer surface and within except for a fleshy lunate callus just below the apical margin, lateral margins fimbriate, the apex emarginate or rarely entire. Column rostrate, arcuate, broadly winged, 3 cm. long and 1–1.2 cm. wide, the under-surface with 2 slender elongate antennae, one unciform, closely approximating the base of the column, the other slightly undulate, the tip extending nearly to the innermost base of the lip. Pistillate flowers relatively infrequent, fleshy, green on outer surfaces, yellow within, usually 2–3 on erect racemes, very similar to those of *C. viridiflavum*, but with the lip somewhat shorter, broader, and rounder.

Nicaragua (*vide* Mansfeld), Costa Rica, Panama, and possibly Colombia.

VERAGUAS: vic. Soná, 200 m., *Allen* 2664; vic. San Felix, 100 m., *Allen* 3658. CHIRIQUÍ: near Dolega, 1000 ft., *Powell* 351; vic. Remedios, 100 ft., *Allen* 4505, 4506, *Allen & Fairchild* 3512; vic. Progreso, 500 ft., *Dunn* s. n.; vic. Concepción, 1000 ft., *Allen* 5165. BOCAS DEL TORO: Chiriquí Lagoon, Bastimentos, *von Wedel* 2006; Water Valley, *von Wedel* 638, 863, 1375, 1435; Western River, *von Wedel* 2780; Little Bocas, *von Wedel* 2544; Isla Colón, Macaw Hills, *von Wedel* 523, 555; Careening Cay, *von Wedel* 568.

A robust, very frequent species of the lowlands of Bocas del Toro, Chiriquí, and Veraguas provinces. It seems to be entirely confined, so far as known, to the western portion of the Republic, being replaced in the vicinity of the Canal by *C. viridiflavum*. The staminate flowers are extremely variable in color, and to a lesser degree in size.

It seems possible that this species may be that collected in 1801 by Humboldt and Bonpland near Cartagena, Colombia, and described by Kunth (Syn. Pl. Aequin. 1:331. 1822) as *Catasetum maculatum*. However, since the description does not agree with the plate in Humboldt, Bonpland and Kunth's 'Nova Genera et Species Plantarum', and since the type apparently no longer exists, it seems best to follow Mansfeld and adopt *C. Oerstedii* as the next available, well authenticated name.

4. *CATASETUM SUAVE* Ames & Schweinf. Sched. Orch. 10:81. 1930.

Epiphytic herbs. Pseudobulbs, leaves, and roots superficially identical with those of *Catasetum eburneum*. Inflorescence an arching raceme from the base of the pseudobulb, 20–30 cm. long. Flowers perfect, 8–13, pedicellate, the smallest of the genus in Panama, pure waxy white, inner lip spotted purple, strongly



Fig. 161. *Catasetum suave*—single flower

fragrant. Sepals subequal, free, somewhat fleshy, very strongly reflexed; dorsal sepal ligular, rounded or subacute, 1.7–2.3 cm. long and .5–1.0 cm. wide, the laterals similar, 1.8–2.3 cm. long and .4–1.0 cm. wide. Petals somewhat fleshy, very strongly reflexed, elliptic-ovate, acute, often with involute margins, 1.5 cm. long and 1–1.4 cm. wide. Lip entire, the

saccate base very fleshy, ovate, acute, with thinner margins and apex, adnate to the base of the column, 1.5–1.6 cm. long and 1–1.2 cm. wide; the basal concavity surrounded by a conspicuous semicircular ridge, with an angulate, subemarginate apex. Column very fleshy, 6–8 mm. long and 5–6 mm. wide. Anther with obtuse lateral lobules, the apex apiculate.

Costa Rica and Panama.

VERAGUAS: Cerro Tuté, region west of Santa Fé, 3000 ft., Allen 4565.

An apparently rare species in Panama, known from a single specimen collected in the mountains of Veraguas and flowered in Gamboa.

Mansfeld, in his monograph of the genus, considers this species, as well as *C. eburneum*, as being identical with *Catasetum dilectum* Rchb. f. Careful comparison of our specimens with Reichenbach's description and figure has disclosed wide discrepancies in nearly every detail of size and structure. Neither of our Panama species have the flat, apiculate lip, subcapitate inflorescence, or pubescent rachis ascribed by Reichenbach to *Catasetum dilectum*.

5. *CATASETUM VIRIDIFLAVUM* Hook. in Bot. Mag. t. 4017. 1843.

Catasetum serratum Lindl. in Bot. Reg. n. s. 10: post t. 24. 1847.

Epiphytic herbs with robust fusiform pseudobulbs 8–25 cm. tall and 2–4.5 cm. wide, identical in vegetative appearance with those of *Catasetum Oerstedii*. Leaves 6–12, plicate, elliptic-lanceolate, acuminate, distichous, 20–45 cm. long and 5–12 cm. wide, the prominent veins persisting as stout spines at the apex of the imbricating bases after the leaf blades have fallen, most noticeable at the apex of the older pseudobulbs where they form a dense spinous cluster. Roots stout, with erect, slender, spinous, secondary rootlets which form a dense mat about the base of the pseudobulbs. Inflorescences erect or arching racemes produced from the base of the pseudobulbs, 25–70 cm. long. Flowers dimorphic, unisexual, the staminate and pistillate forms borne on separate scapes. Staminate flowers: those most frequently seen, 2–12, relatively large and conspicuous. Sepals membranaceous, free, subequal, pale green aging yellow, the dorsal sepal concave, elliptic-lanceolate,



Fig. 162. *Catesetum viridiflavum*

(366)

acute, 3.5–5 cm. long and 1.0–2.5 cm. wide, the laterals spreading, oblanceolate, acute, 4.5–5 cm. long and 1.5–3.0 cm. wide. Petals membranaceous, pale green aging yellow, ovate, acute, 3.5–4.5 cm. long and 2–3 cm. wide, the inner margins somewhat overlapping, forming with the dorsal sepal a concave trough under the column. Lip very firm, fleshy, globose, 3–3.5 cm. long and 3–3.5 cm. broad, with an abrupt, conical basal constriction, outer surface glabrous, yellow, the lateral margins minutely ciliate, pale green, aging yellow, apex obscurely emarginate; inner lip orange, strongly rugose-striate, terminating in a spreading fleshy callus just below the apex. Column rostrate, arcuate, broadly winged, 3.5 cm. long and 1.2 cm. broad, the under-surface with 2 elongate antennae, one usually unciform, the tip of the other extending nearly to the inner base of the lip. Anther rostrate; pollinia normal, ejected with considerable force on the slightest disturbance of the anther or antennae. Pistillate flowers relatively infrequent, 2–4 on an erect raceme. Sepals subequal, fleshy, green, spreading or reflexed, the dorsal sepal rectangular, obtuse or broadly acute, 1.5–2 cm. long and 1–1.2 cm. wide, the laterals broadly ligular, obliquely acute, 2–2.5 cm. long and 1.0–1.2 cm. broad. Petals fleshy, green, erect or reflexed, elliptic-lanceolate, acute, 2–2.5 cm. long and 1.2–1.5 cm. broad. Lip fleshy, firm, calceiform, 3–4 cm. long and 2.5–2.7 cm. broad, green on the outer surfaces, aging greenish yellow within, glabrous throughout. Column fleshy, very short, stout, 8–10 mm. long and 8–10 mm. broad, roughly triangular in cross-section, green or greenish yellow. Stigma normal.

Panama.

CANAL ZONE: Barro Colorado Island, Gatún Lake, *Woodworth s. n.*; vic. Nuevo Limón, *Babbitt s. n.*; Barro Colorado Island, *Kennerly 252, 253*; Frijoles, *Powell 3556*; among floating islands, north arm of Gigante Bay, *Dodge 3482*; vic. Gamboa, 100 ft., *Allen 5149*. PANAMA: vic. Arenoso, lower Rio Trinidad, 26–50 m., *Seibert 597*; Bella Vista, sea level, *Killip 12040*; drowned forest near Vigia and San Juan, Rio Pequeni, 66 m., *Dodge, Steyermark & Allen 16591*; hills northeast of La Joya, 50–300 m., *Dodge et al. 16904*; Pacora, 50 m., *Allen 4502, 4524, Fairchild s. n.*; San José Island, Perlas Archipelago, *Johnston 333*. COCLÉ: hills south of El Valle de Antón, 2000 ft., *Fairchild s. n.*

A very frequent species, apparently confined to the lowlands in the eastern half of the Republic.

6. *CATASETUM* WARCZEWITZII Lindl. & Paxt. in Paxton's Flow. Gard. 1:45, fig. 29. 1850–51.

Catasetum scurra Rehb. f. in Gard. Chron. 1003. 1872.

Dwarf epiphytic herbs, with clustered, stout, ovate, acute pseudobulbs 3–9 cm. tall and 2–4 cm. wide, often becoming conspicuously ridged and wrinkled with age, nearly identical in appearance with those of *Catasetum bicolor*. Leaves 4–6, elliptic-lanceolate, plicate, ultimately deciduous, 12–40 cm. long and 2.5–8 cm. wide, the broad imbricating bases enveloping the pseudobulbs, persistent for a year or more after the blades have fallen, drying grayish white, the strong midribs projecting beyond the old suture line as sharp spines, clustered at the apex of the

old pseudobulbs. Inflorescences laxly pendent, unbranched racemes from the base of the pseudobulbs. Flowers perfect, 5-8, relatively large and conspicuous. Sepals membranaceous, white or greenish white, striped pale green, dorsal sepal concave, erect, ovate, obtuse, 10-12 mm. long and 8-10 mm. broad, laterals spreading, adnate at the base, obliquely ovate, obtuse, 15-18 mm. long and 10-14 mm. wide. Petals membranaceous, subequal to the sepals, white or greenish white, striped pale green, spreading, concave, ovate, obtuse, 10-12 mm. long and 10-12 mm. wide. Lip 3-lobed, white or greenish white, striped pale green, the base saccate and somewhat fleshy, hinged to the base of the column, the lateral lobes erect, the anterior margins spreading, fimbriate, mid-lobe reflexed, the apex strongly fimbriate. Column short, the under-surface without antennae, inflated at the apex, 6-7 mm. long.

Costa Rica, Panama, Colombia, and Venezuela.

CANAL ZONE: Gatún Lake, sea level, *Powell* 60; Frijoles, sea level, *Powell* 3477. PANAMÁ: Río La Maestra, 0-25 m., *Allen* 57; drowned forest below the Río Indio Hydrographic station, 70 m., *Steyermark* 17379; without definite locality, *Pring* s. n. COCLÉ: El Valle de Antón, 600 m., *Allen* 3916; El Valle, 1800 ft., *Fairchild* s. n.

A frequent species found in the lowlands of both coasts, and at least on the Pacific slope up to about 3000 ft. elevation.

48. CYCNOCHES Lindl.

CYCNOCHES Lindl. Gen. & Spec. Orch. Pl. 154. 1832; Benth. & Hook. Gen. Pl. 3:552. 1883; Schltr. in Orchis 10:47-61. 1916.

Epiphytic herbs with short or elongate, often slightly undulate pseudobulbs of uniform thickness, tapering at the apex. Leaves few to many, distichous, lanceolate, acuminate, plicate, the blades deciduous, the unarmed, imbricating, persistent, grayish white papery bases tightly enveloping the stems. Inflorescences arching or pendent, unbranched racemes, produced in succession from the upper leaf axils while the plants are still in leaf, or from near the apex of the upper imbricating leaf bases after the blades have fallen. The species of the genus fall into two well marked subgeneric sections. In EUCYCNOCHES, which contains the generic type: both staminate and pistillate flowers large and conspicuous, usually produced on separate scapes, although mixed inflorescences containing both forms may rarely be seen. Sepals and petals in both sexes similar, fleshy or membranaceous, erect or reflexed, the lip in both fleshy, without marginal teeth. Structural differences in this section almost entirely confined to the column, that of the staminate flowers very slender, terete, elongate, and arcuate, bearing the anther at the apex, without a functional stigma or ovary; the pistillate column short, stout, fleshy, more or less winged, particularly at the apex, without an anther, but with a normal stigma and ovary. In HETERANTHAE: staminate and pistillate flowers strikingly dissimilar in size, color and structure, usually produced on separate scapes although mixed inflorescences are rarely seen. Pistillate flowers relatively large and fleshy,

similar in structure to those of the subgenus *EUCYNOCHES*, usually produced on short, arching, few-flowered racemes. Staminate flowers small, on elongate, often dense, pendent racemes. Sepals and petals membranaceous, spreading or reflexed, often undulate, the lip reduced to a small ligular, triangular or rounded, usually concave disk, margined by long or short-pointed, forked, rounded or clavate teeth. Column slender, terete, arcuate. In both subgeneric sections the anther of the staminate form is terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 2, waxy.

An extremely interesting but poorly understood genus of American epiphytic orchids ranging from Mexico to Peru and Brazil. Schlechter's revision, published in 1916, lists sixteen species, to which some nine or ten have been added to date. Present evidence would indicate that of this considerable total about ten actually represent fairly consistent and valid entities, six of which are known to occur in Panama.

- a. Both staminate and pistillate flowers large, nearly identical except for the column. Lip of both sexes very fleshy, with a membranaceous margin or apex, that of the staminate flowers without marginal teeth (Subgenus *EUCYNOCHES*).
 - b. Lip sessile or nearly sessile, broadly elliptic-lanceolate, acute, convex, nearly twice as long as broad, with a narrow, ovate, obtuse depression below the projecting triangular, basal callus..... 2. *C. CHLOROCHILON*
 - bb. Lip truly clawed at the base, strongly ventricose.
 - c. Basal claw of the lip elongate; basal callus broadly obtuse at the apex, not projecting, the surrounding blotched area not depressed... 6. *C. VENTRICOSUM*
 - cc. Basal claw of the lip short; basal callus triangular, acute, projecting, the surrounding area with a broadly lunate depression..... 5. *C. TONDUZII*
 - aa. Staminate and pistillate flowers strikingly dissimilar; pistillate flowers fleshy, relatively large, the lip nearly flat or slightly convex; staminate flowers small, membranaceous, in short or elongate, pendent racemes. Lip truly clawed at the base, the mid-portion concave, with marginal teeth (Subgenus *HETERANTHAE*).
 - b. Staminate flowers relatively large. Sepals and petals spreading or only the apices recurved. Lip 2-2.5 cm. long, ovate, the basal concavity elliptic, broadly lanceolate. Marginal teeth slender, elongate, usually forked at the apex..... 1. *C. AUREUM*
 - bb. Staminate flowers relatively small. Sepals and petals usually strongly recurved and often undulate or revolute. Lip about 1-1.5 cm. long, the basal concavity ovate to orbicular, terminating in a slender lanceolate or ligular apex. Marginal teeth usually rounded or clavate, sometimes forked at the apex.
 - c. Marginal teeth very short, rounded or subclavate, inconspicuous in dried specimens..... 3. *C. DIANAE*
 - cc. Marginal teeth elongate, truncate, clavate, or rarely forked at the apex, very conspicuous in dried specimens..... 4. *C. EGERTONIANUM*
1. *CYNOCHES AUREUM* Lindl. & Paxt. in Paxton's Flow. Gard. 3:6, t. 75. 1852-53.

Erect epiphytic herbs with stout or slender, cylindric pseudobulbs of uniform thickness, tapering at the apex, 15-30 cm. tall and 2-6 cm. wide; larger, very robust plants infrequently found growing on decaying wood and differing very considerably in superficial appearance from the more familiar slender type. Leaves

6-10, lanceolate, acuminate, plicate, ultimately deciduous, the unarmed, persistent, grayish white, papery, sheathing bases tightly enveloping the stems. Inflorescences produced from the upper half of the pseudobulb, usually either all staminate or all pistillate flowers, although mixed scapes are infrequently seen. Staminate flowers those most frequently produced: relatively large, 6-8 cm. in diameter when spread out, usually borne on long pendulous racemes. Sepals subequal, membranaceous, spreading, only the apices reflexed, pale yellowish green, sometimes veined darker green or nearly white, with minute rose-red spots, dorsal sepal erect, oblanceolate, acute, 3.5-4 cm. long and 1.0-1.2 cm. wide, laterals spreading, elliptic-lanceolate, acute, 3-3.5 cm. long and 1.5-1.8 cm. broad. Petals spreading, oblanceolate, acute, somewhat oblique, colored like the sepals, 3.5-3.8 cm. long and 1.4-1.6 cm. broad. Lip membranaceous, ovate or triangular, acute, white, often obscurely striped green, the middle concavity including the apex 2-2.5 cm. long and 1-1.2 cm. wide, the lateral margins with elongate, slender, arcuate teeth, most of which are forked at the apex, the base of the middle concavity with 2 erect fleshy elongate truncate crests. Column slender, arcuate, terete, 3.5 cm. long, dilated at the apex; pollinia 2, waxy. Pistillate flowers: relatively infrequent, usually 2-4 on short arching scapes, or rarely subtended by several to many of the staminate form, fleshy throughout. Sepals free, spreading, subequal, yellowish green, obscurely veined darker green, the dorsal sepal 4.5-5.5 cm. long and 1.8-2.2 cm. wide, the laterals 4.5-5 cm. long and 1.8-2 cm. wide. Petals similar to the sepals but broader, 3.5-4 cm. long and 2.2-2.5 cm. broad. Lip very fleshy, slightly convex, ovate, acute, greenish yellow shading to green at the apex, about 3 cm. long and 2.0-2.2 cm. wide, with a basal brown lunate crest. Flowers aging greenish yellow, with narrow brown margins to all segments. Column very stout, about 15 mm. long and 4 mm. in diameter at the terete base, the truncate apex dilated, very variable in width, with a triangular or auriculate fleshy wing on each side of the stigmatic surface.

Costa Rica and Panama.

COCLÉ: El Valle de Antón, 800 m., *Koerber s. n.*; region north of El Valle de Antón, 2000 ft., *Allen 5166*; floor of El Valle de Antón, 600 m., *Allen 3628*; El Valle Chiquito, headwaters of the Río Mata Ahogado, 900 m., *Dunn s. n.* (under *Allen 3800*).

2. *CYNOCHES CHLOROCHILON* Klotzsch, in *Allgem. Gartenzeit.* 6:225. 1838.

Cynoches Warszewiczii Rehb. f. in *Bot. Zeit.* 10:734. 1852.

Erect epiphytic herbs, with pseudobulbs and leaves typical of the genus. Inflorescences usually of all staminate or all pistillate flowers. Flowers in either case large and fleshy, differing from one another only in the structure of the column; lip sessile or very nearly so. Staminate flowers those most frequently seen: Sepals subequal, free, spreading, yellowish green, the dorsal sepal erect, lanceolate, acute, concave, 9-11 cm. long and 1.6-1.7 cm. wide, laterals spreading, subfalcate, lanceolate, acute, 6.5-7.5 cm. long and 1.4-1.6 cm. wide. Petals spreading, ellip-

Fig. 163. *Cynoches aureum*

(371)

tic-lanceolate, subfalcate, acute, yellowish green, 7-8 cm. long and 2-2.5 cm. wide. Lip fleshy, sessile or very nearly sessile at the base, elliptic-lanceolate, acute, convex toward the middle, not strongly ventricose, 6-6.5 cm. long and 2.5-3.2 cm. wide, white with a dark green, ovate, obtuse depression below the fleshy, triangular, acute, projecting, dark green, basal callus. Column elongate, slender, terete, arcuate, 2.8-3.2 cm. long, dilated at the apex. Anther and pollinia normal. Pistillate flowers less frequently seen: identical with the staminate except for the structure of the column, which is short and stout with two fleshy, auriculate, lateral wings at the apex; stigma normal.

Panama, Colombia, Venezuela, and the Guianas.

PANAMÁ: Río La Maestra, 0-25 m., Allen 65. CHIRIQUÍ: Cordillera, von Warscewicz.

A South American species, having its northern limit of known distribution in Panama, where it apparently is rare. It is distinguished from the common *Cycnoches Tonduzii* of Chiriquí and Veraguas Provinces by the somewhat larger flowers, the sessile or very nearly sessile, elliptic-lanceolate, convex, not strongly ventricose lip, and the ovate, obtuse depression below the basal callus. Although *Cycnoches chlorochilon* has been collected in Panama only twice, it is to be expected particularly east of the Canal Zone and in Darien Province.

3. *CYCNOCHES DIANAE* Rchb. f. in Bot. Zeit. 10:636. 1852.

Cycnoches Powellii Schltr. in Fedde Rep. Sp. Nov. Beih. 17:58. 1922.

Erect epiphytic herbs with slender cylindric pseudobulbs 15-30 cm. tall and 2-3 cm. in thickness. Leaves plicate, deciduous, typical of the genus. Staminate inflorescences those most frequently seen, usually densely flowered, elongate and pendulous: Sepals membranaceous, free, subequal, rosy pink with white shadings, dorsal sepal erect, undulate, the apex recurved, lanceolate, acute, 2.3-2.6 cm. long and .7-.9 cm. wide, laterals often strongly reflexed, the apices recurved, lanceolate, acute, 2-2.2 cm. long and .6-.8 cm. wide. Petals membranaceous, colored similarly to the sepals, spreading, the apical halves very strongly recurved or revolute, elliptic-lanceolate, acute, 2-2.2 cm. long and 0.9-1.1 cm. wide. Lip membranaceous, truly clawed at the base, middle concavity white, orbicular, lateral margins crenate or with very short rounded or subclavate teeth, apex linear-lanceolate, acute, about equaling the middle concavity in length, base of the middle concavity with 2 erect, fleshy, ligular crests. Column very slender, arcuate, dilated at the apex. Anther and pollinia normal. Pistillate flowers relatively large and fleshy, nearly identical with those of *Cycnoches aureum*, produced on short, arching, few-flowered racemes, or rarely subtended by few or many of the smaller staminate form.

Panama, and probably Costa Rica.

CHIRIQUÍ: Caldera River, 4500 ft., Powell 186; Chorch Berg, 3000-4000 ft., Warscewicz s. n.

This species seemingly is recorded only from the intermediate highlands of Chiriquí Province in Panama, although it is to be expected in adjacent Costa Rica. It differs from the closely related *Cycnoches Egertonianum* in the much shorter marginal teeth on the lip of the male flowers.

4. *CYCNOCHES EGERTONIANUM* Batem. Orch. Mex. et Guat. t. 40 (in part). 1837-42.

Cycnoches ventricosum var. *Egertonianum* Hook. in Bot. Mag. t. 4054. 1844.

Cycnoches stelliferum Lodd. in Cat. Orch. 25. 1844 (nom. nud.); Lindl in Bot. Reg. n. s. 9: sub t. 46, in syn. 1846.

Cycnoches glanduliferum Rich. & Gal. ex Hemsl. in Gard. Chron II, 11:268. 1879.

Cycnoches peruvianum Rolfe, in Lindenia 7:29, t. 301. 1891.

Cycnoches Rossianum Rolfe, in Gard. Chron. III, 9:456. 1891.

Cycnoches densiflorum Rolfe, in Kew Bull. 63. 1909.

Cycnoches guttulatum Schltr. in Fedde Rep. Sp. Nov. Beih. 17:56. 1922.

Cycnoches pachydactylon Schltr. loc. cit. 57. 1922.

Cycnoches stenodactylon Schltr. loc. cit. 59. 1922.

Cycnoches Amparoanum Schltr. loc. cit. 19:48. 1923.

Cycnoches pauciflorum Schltr. loc. cit. 137. 1923.

Epiphytic herbs, typical of the genus, nearly identical with *C. aureum* and *C. Dianae*. Flowers dimorphic, unisexual. Staminate flowers those most frequently seen, produced in long, dense, pendent racemes from the upper half of the pseudobulbs: sepals membranaceous, subequal, green suffused purple on the frontal surfaces, or more frequently green or greenish tan spotted with red-brown, maroon or purple, dorsal sepal erect, lanceolate, acute, the apex often recurved, 2.5-3 cm. long and .5-.7 cm. wide, the laterals spreading, elliptic-lanceolate, acute, often with the apical half strongly revolute, 2-2.5 cm. long and .6-1.0 cm. wide. Petals membranaceous, colored similarly to the sepals, spreading, the apical half usually strongly revolute, elliptic-lanceolate, acute, 2-2.5 cm. long and 1-1.2 cm. wide. Lip membranaceous, truly clawed at the base, green tinged purple to pure white, the middle concavity ovate to orbicular, the lateral margins with elongate, rounded, clavate, or rarely forked teeth, equaling or exceeding the middle concavity in length; apical lobe lanceolate, acute or acuminate, the base of the middle concavity with 2 erect, truncate or subclavate, fleshy crests. Column slender, terete, arcuate, 2 cm. long, dilated at the apex. Anther normal; pollinia 2, waxy. Pistillate flowers relatively large, fleshy, borne on short, arching, few-flowered racemes, nearly identical with those of *Cycnoches aureum*.

Mexico, Guatemala, Honduras, Costa Rica, Panama, Colombia, Peru, and Brazil.

CANAL ZONE: Balboa, Powell 159; lake shore along Gatún River valley, Pittier 6802; Gatún Lake and other low places, under 100 ft., Powell s. n. PANAMÁ: hills near city, sea level, Powell s. n. COCLÉ: El Valle de Antón, 1000 m., Allen 3639; floor of El Valle, 600 m., Allen 3627, 650 m., Dunn s. n.; El Valle Chiquito, 1800-2000 ft., Allen 4500, 5080, 5162. CHIRIQUÍ: without definite locality, 3000-3500 ft., Powell 173.

A frequent species, somewhat variable in the color of the male flowers and in the relative number, length, and termination of the apex of the marginal teeth of

the lip. Much has been made of these differences, but a considerable amount of field observation in Panama, Costa Rica, and Honduras, together with careful examination of the now fairly adequate collections, discloses that scarcely any two specimens are exactly alike in these characters, even within the limits of the so-called species. It is rather significant that most of these species have been described from single specimens, or from several inflorescences produced in cultivation probably from the same plant.

5. *CYNOCHESES TONDUZII* Schltr. in Fedde, Rep. Sp. Nov. Beih. 19:298. 1923.

Epiphytic herbs, the more robust plants usually found growing on decaying wood or where they have been fertilized in some manner. Pseudobulbs slender, often somewhat undulate, uniformly cylindric, tapering at the apex, 15–70 cm. tall and 2.5–4 cm. wide. Leaves distichous, broadly lanceolate, plicate, the blades



Fig. 164. *Cynocheses Tonduzii*—
pistillate flower

ultimately deciduous, 15–45 cm. long and 2–10 cm. wide, the unarmed, persistent, grayish or greenish white, papery, closely imbricating bases tightly enveloping the stems. Inflorescences few to many, usually produced in succession from the upper leaf axils either while the leaves are present or after they have fallen. Flowers quite variable in size. Staminate and pistillate flowers identical in structure except for the column, usually produced on separate arching or pendent racemes. Staminate flowers those most frequently seen: sepals free, spreading, fleshy, green aging greenish yellow, the dorsal sepal erect, lanceolate to ellip-

tic-lanceolate, acute, concave, 4–7 cm. long and 1–2 cm. broad, the tip often recurved, laterals spreading, subfalcate, acute, 4–6 cm. long and 1.5–2.5 cm. wide. Petals fleshy, spreading, elliptic-lanceolate, subfalcate, acute, green aging greenish yellow, 4–6 cm. long and 1.8–3.5 cm. broad. Lip shortly clawed at the base, ovate, obovate, or subcordate, 3.5–4 cm. long and 1.8–3.5 cm. wide, pure white, mid-portion very fleshy, strongly ventricose, the apex and lateral margins somewhat recurved, membranaceous; basal callus fleshy, dark green, triangular, acute, conspicuously projecting, surrounded by a dark green lunate depression. Column very slender, arcuate, 2.2–3.5 cm. long, terete, the apex dilated and rather triangular in cross-section; anther normal; pollinia 2, waxy. Pistillate flowers relatively infrequent, usually 2–4 on short arching racemes, identical with the staminate form except for the column: column stoutly arcuate, 2–2.5 cm. long and 5–6 mm. in thickness at the terete mid-portion, dilated and truncate at the apex, with a triangular or auriculate fleshy wing on each side of the normal stigma.

Costa Rica and Panama.

COCLÉ: El Valle de Antón, lower portion of the valley and marshes along the Río Antón, 500 m., *Hunter & Allen 433*. VERAGUAS: vic. Río Tabasará, on large trees in open pastures, 100 m., *Allen 3913, 3914, 3915, 3979*. CHIRIQUÍ: Río Tabasará, 50 m., *Allen 2930*; Concepción, 1000 ft., *Allen 5154*; vic. Gualaca, 500 ft., *Allen 5153*; vic. Progreso, 1000 ft., *Dunn s. n.*; vic. Dolega, 1000 ft., *Dunn s. n.*; same locality, *Powell 3497*.



Fig. 165. *Cycnoches Tonduzii*

The species is quite variable in regard to size of plant, size of flower, and in the relative length and width of the lip. The larger-flowered forms are among the most attractive of all orchids, combining delicacy of color with exquisite form and fragrance.

The identity of this frequent and attractive species of western Panama and Costa Rica is a controversial issue. The flowers differ from *Cycnches ventricosum* in the much shorter basal claw and in the conspicuous triangular basal callus, and from *C. chlorochilon* in the uniformly smaller flowers, longer basal claw, lunate, not ovate obtuse depression below the basal crest, and the strongly ventricose lip. The name *C. Warszewiczii* of Reichenbach has been used, but all present evidence indicates that this name is referable to *C. chlorochilon*.

6. *CYCNCHES VENTRICOSUM* Batem. Orch. Mex. et Guat. t. 5, 40 (in part). 1837-42.

Erect epiphytic herbs. Plants typical of the genus. Staminate and pistillate flowers identical except for the column. Staminate flowers those most frequently seen: sepals and petals membranaceous, green aging greenish yellow, strongly reflexed. Lip white, with an elongate basal claw, ovate, acute, the fleshy mid-section strongly ventricose, usually without thinner lateral margins, the apex membranaceous. Basal callus broadly rounded, not projecting, the surrounding lunate, dark green blotch not depressed.

Mexico, Guatemala, Honduras, and Panama.

PANAMÁ: definite locality unknown, Fairchild s. n.

The citation of this species, which hitherto has been known only from Mexico and northern Central America, is based on flowers preserved in liquid from two plants flowering in the collection of Dr. Graham Fairchild. Dr. Fairchild was of the opinion that the plants had been collected originally in the lowlands of Veraguas Province.

49. *COELIOPSIS* Rchb. f.

COELIOPSIS Rchb. f. in Gard. Chron. 9. 1872.

Epiphytic herbs superficially resembling plants of *Acineta*. Pseudobulbs stout, ovoid or subcylindric, with 3-4 plicate, prominently veined, oblanceolate, acuminate leaves at the apex. Inflorescences short, pendent, dense, subcapitate racemes from the base of the pseudobulbs. Flowers few to about 15, waxy white. Sepals very fleshy, the dorsal sepal free, concave, arching over the column, laterals connate at the base, forming a conspicuous mentum. Petals much narrower than the sepals. Lip 3-lobed, the lateral lobes erect with spreading apices, mid-lobe rectangular or ovate, longer than broad, truncate or obtuse, strongly reflexed, with ciliate margins. Column short, subclavate, obtuse, winged. Anther terminal, operculate, imperfectly 2-celled; pollinia 2, waxy.

A monotypic genus of epiphytic orchids known only from Panama and Costa Rica.

1. *COELIOPSIS HYACINTHOSMA* Rchb. f. in Gard. Chron. 9. 1872.

Epiphytic herbs. Pseudobulbs stout, ovoid or subcylindric, often longitudinally wrinkled, 6.5–8.5 cm. long and 2.5–4 cm. wide, the base usually enveloped in 3–5 brown, papery, closely imbricating bracts, the apex truncate, unarmed, with 3–4 oblanceolate, acuminate, plicate, prominently veined leaves 30–50 cm. long and 2–7 cm. wide. Inflorescences 4–5 cm. long, pendent, subcapitate racemes produced from the base of the pseudobulbs, basal portion tightly enveloped in the papery brown, imbricating bracts. Flowers few to about 15. Sepals white, very fleshy, the dorsal sepal free, concave, ovate, acute, 18–20 mm. long and 9–12 mm. wide, arching over the column; laterals connate at the base, forming a conspicuous mentum, the apices spreading, obliquely lanceolate, acute, 20–22 mm. long and 10–12 mm. wide. Petals white, lanceolate, acute, 15–16 mm. long and 5–6 mm. wide. Lip 3-lobed, 1.6–1.8 cm. long and 1.2–1.4 cm. wide, white, the inner lip with an orange spot, lateral lobes erect, with spreading, ciliate, apical margins, mid-lobe rectangular or ovate, truncate or obtuse, strongly reflexed, with ciliate margins. Column short, 9–11 mm. long, subclavate, winged, obtuse, white with a small purple blotch at the base. Anther pure white.

Panama and Costa Rica.

PANAMÁ: Cerro Campana, cloud forest, 3000 ft., *Allen 5184*. COCLÉ: hills north of El Valle de Antón, about 1000 m., *Allen 2402*. CHIRIQUÍ: without definite locality, *Powell 423*.

A fairly frequent species in wet, intermediate, highland forests of Panama and Costa Rica.

49-A. *ERIOPSIS* Lindl.

ERIOPSIS Lindl. in Bot. Reg. n. s. 10: post *t. 9, t. 18*. 1847; Benth. & Hook. Gen. Pl. 3:545. 1883.

Pseuderiosis Rchb. f. in Linnaea 22:852. 1849.

Epiphytic herbs with pyriform or elongate pseudobulbs, the apex usually with 2 broad, plicate, strongly veined leaves. Inflorescences erect or arching, unbranched racemes from the base of the pseudobulbs. Flowers few to many. Sepals subequal, spreading, free, or the laterals connate at the base, forming a short mentum with the foot of the column. Petals subequal to the sepals. Lip 3-lobed, the laterals erect, the mid-lobe small, spreading, entire or 2-lobed; base of lip attached to the foot of the column; disk lamellate. Column elongate, semiterete, somewhat arcuate, dilated or subclavate but not winged; base produced into a short foot. Anther terminal, operculate, incumbent, 1-celled; pollinia 2 or 4, waxy.

A small genus of epiphytic highland orchids ranging from Costa Rica to Peru and Brazil. A single species is known to occur in Panama, the few plants found to date all unfortunately being sterile. This species is, however, sufficiently distinctive even when not in flower to be cited without hesitation.

1. *ERIOPSIS RUTIDOBULBON* Hook. in Bot. Mag. t. 4437. 1849.

Epiphytic herbs with stout, pyriform pseudobulbs which are nearly black and covered with innumerable fine wrinkles, the apex with 2-3 broadly lanceolate, acute or shortly acuminate, subcoriaceous, plicate, strongly veined leaves. Inflorescences erect or arching, unbranched racemes 30-45 cm. long, produced from the base of the pseudobulbs. Flowers few to many. Sepals subequal, free, spreading, dull orange-yellow with red-purple margins, the dorsal sepal linear-lanceolate, obtuse or shortly acute, 1.6-1.8 cm. long and .5-.6 cm. wide, laterals elliptic-lanceolate, acute, 1.6-1.8 cm. long and .5-.6 cm. wide. Petals subequal to the sepals, similarly colored, lanceolate, acute, 1.5-1.7 cm. long and .35-.4 cm. wide. Lip 3-lobed, 1.5-1.8 cm. long and .9-1.1 cm. wide when spread out, the lateral lobes rounded, dull orange-red spotted dark purple, the mid-lobe spreading, emarginate or 2-lobed at the apex, white spotted dark purple; disk with erect fleshy keels. Column 9-11 mm. long, subclavate, somewhat arcuate, greenish.

Panama, Colombia, and Peru.

Sterile plants of what in all probability are this species have been seen in recent years in Chiriquí Province at about 6000 ft. elevation, and more frequently in the wet forested region north of El Valle de Antón, in Coclé. It seems to be a rare plant.

50. *SIEVEKINGIA* Rchb. f.

SIEVEKINGIA Rchb. f. Beitr. Syst. Pfl. 3. 1871.

Epiphytic herbs, with pseudobulbs ovoid or subcylindric, monophyllous or rarely diphyllous at the apex. Leaves plicate, lanceolate or elliptic-lanceolate, acute, or shortly acuminate. Inflorescences short or elongate, pendent or rarely arching racemes from the base of the pseudobulbs. Flowers few to many. Sepals free, concave, spreading, subequal. Petals subequal to the sepals but usually narrower. Lip rhombic to ovate, or obovate-triangular, the lateral margins erect, the apex usually acute and spreading; disk with erect lamellae, or basal, elongate, denticulate processes. Column subarcuate, broadly winged or dilated. Anther terminal, operculate; pollinia 2, waxy.

A small genus of American epiphytic orchids ranging from Costa Rica to British Guiana and Colombia to Ecuador and Peru. They are seldom collected, perhaps because they are often mistaken for immature *Stanhopea* seedlings. A single species has been found in Panama.

1. *SIEVEKINGIA SUAVIS* Rchb. f., Beitr. Syst. Pfl. 3. 1871.

Dwarf epiphytic herbs. Pseudobulbs ovate, somewhat angulate, 1.5-3 cm. tall and 1.0-1.5 cm. wide, sheathed at the base in 2-3 papery bracts, the apex with

a single lanceolate or elliptic-lanceolate, acute or shortly acuminate, plicate, subcoriaceous leaf 8–25 cm. long and 1.5–3.2 cm. wide. Inflorescences short, pendent racemes produced from the base of the pseudobulbs. Flowers about 6 or fewer. Sepals subequal, free, spreading, pale lemon-yellow, dorsal sepal concave, elliptic-lanceolate, acute, 10–17 mm. long and 4–8 mm. wide; laterals concave, elliptic-lanceolate, acute, 12–17 mm. long and 4–8 mm. wide. Petals orange, lanceolate, acute, 10–15 mm. long and 3–6 mm. wide. Lip ovate or obovate-rhombic when spread out, 8–11 mm. long and 6–10 mm. wide, orange with reddish purple spots, subnavicular, the lateral margins erect, the apex acute and spreading; disk with 3 prominent or obscure, erect keels, the central keel prolonged and terminating in an inconspicuous 2-lobed scale. Column somewhat arcuate, 6–8 mm. long, green, broadly winged, the wings orange.

Costa Rica and Panama.

COLÓN: Cativo-Porto Bello trail, sea level, *Powell 379*; Río Llano Sucio, vic. Puerto Pilón, 100 m., *Butcher s. n.* (under *Allen 2841*).

Apparently a rare species. The Panama specimens are consistently smaller in all respects than those seen from Costa Rica, but other than in size there seem to be no differences.

51. KEGELIELLA Mans.

KEGELIELLA Mans. in *Fedde Rep. Sp. Nov.* 36:60. 1934.

Kegelis Rchb. f. in *Bot. Zeit.* 10:670. 1852.

Small epiphytic herbs, the plants considerably resembling those of a small *Gongora* or *Stanhopea*. Pseudobulbs ovoid, somewhat compressed, angulate, the apex with 2–3 broadly elliptic-lanceolate, acute, plicate leaves. Inflorescences pendent racemes from the base of the pseudobulbs, the rachis densely covered with glandular hairs. Flowers relatively small, about 6 or fewer. Sepals subequal, free, spreading, lanceolate or elliptic-lanceolate, acute or acuminate, covered with glandular hairs on the outer surfaces. Petals subequal to the sepals but narrower and shorter, lanceolate or oblanceolate, acute or acuminate. Lip membranaceous or fleshy, 3-lobed, the lateral lobes large, spreading or erect, obliquely angulate and subdolabriform when spread out, or broadly ovate and subtruncate toward the basal claw, mid-lobe small, subcordate or triangular, concave or flat, separated from the laterals by emarginate sinuses or plicate folds; disk with an erect, fleshy, laterally compressed or carinate, dorsally 1- or 2-sulcate, 2-lobed or acute linguiform callus. Column elongate, more or less arcuate, slender below, broadly winged above, without a foot. Anther terminal, operculate, incumbent, 1-celled. Rostellum elongate, the apex obcordate or acuminate; pollinia 2, waxy.

An extremely rare genus of American epiphytic orchids previously known from a few specimens collected in Costa Rica, Jamaica, Trinidad, and Surinam. Two species have been described, both of which have been found in Panama.

- a. Lip membranaceous; apical lobe flat, spreading, conspicuously separated from the lateral lobes by marginal sinuses..... 1. K. HOUTTEANA
 aa. Lip fleshy; apical lobe concave, confluent with the laterals, separated only by plicate folds..... 2. K. KUPPERI

1. *KEGELIELLA HOUTTEANA* (Rchb. f.) L. Wms. in Ann. Mo. Bot. Gard. 29:347. 1942.

Kegelia Houtteana Rchb. f. in Bot. Zeit. 10:670. 1852.

Dwarf epiphytic herbs, with ovoid, laterally compressed, somewhat angulate pseudobulbs 1.5–2 cm. long and 1–1.5 cm. wide, the apex with 3 broadly elliptic-lanceolate, acute, plicate leaves 9–13 cm. long and 3.5–5 cm. wide. Inflorescences pendulous racemes about 10 cm. long from the base of the pseudobulbs, the rachis densely covered with minute reddish glandular hairs. Flowers few, relatively small. Sepals membranaceous, subequal, free, concave, spreading, pale yellow, the outer surfaces with minute reddish glandular hairs, dorsal sepal lanceolate, acuminate, 12–15 mm. long and 3–4 mm. wide, laterals elliptic-lanceolate, acuminate, 14–16 mm. long and 4–5 mm. wide. Petals lanceolate, acuminate, pale yellow barred red, 11–12 mm. long and 1.5–2.5 mm. wide. Lip 3-lobed, membranaceous, yellow, 9–11 mm. long and 5–7 mm. wide when spread out, lateral lobes erect, obliquely angulate or subdolabriform when spread out, mid-lobe triangular or subcordate, flat, spreading, separated from the laterals by emarginate sinuses; disk with an erect, fleshy, laterally compressed, more or less 2-lobed linguiform callus. Column 10–12 mm. long, somewhat arcuate, apple-green, slender below, broadly winged above. Anther yellow.

Panama, Jamaica, Trinidad, and Surinam.

COCLÉ: region north of El Valle de Antón, vic. of La Mesa, 1000 m., Allen 2759.

Sterile plants of what may also be this species have been recently collected on the upper wet forested slopes of mountains west of Santa Fé, in Veraguas. Apparently rare.

2. *KEGELIELLA KUPPERI* Mansf. in Fedde Rep. Sp. Nov. 36:60. 1934.

Small epiphytic herbs with ovoid, somewhat compressed and angulate pseudobulbs 2–3 cm. long and 1–2 cm. wide, the apex with 2 elliptic-lanceolate, acute, plicate leaves 4–8 cm. long and 1.5–3 cm. wide. Inflorescences pendent racemes 9–12 cm. long, produced from the base of the pseudobulbs, the rachis densely covered with minute brown glandular hairs, at least above. Flowers relatively small, from solitary to about 6. Sepals membranaceous, subequal, free, spreading, concave, the outer surfaces densely covered with minute glandular hairs, dorsal sepal lanceolate, acuminate, 16–18 mm. long and 5–6 mm. wide, laterals elliptic-lanceolate, acuminate, 1.7–1.9 cm. long and .6–.65 cm. wide. Petals oblanceolate, acute or acuminate, 1–1.3 cm. long and 3–3.2 mm. wide. Lip 3-lobed, fleshy, the lateral lobes large, rounded, spreading, mid-lobe small, subcordate, concave, separated from the lateral lobes by plicate folds; disk with an erect, fleshy, carinate,

acute, linguiform callus. Column 10–12 mm. long, somewhat arcuate, slender below, broadly winged above.

Costa Rica and Panama.

COLÓN: Quebrada López, slopes of Cerro Santa Rita, 100 ft., *Butcher s. n.* (under Allen 2108).

This is apparently the second collection of this exceedingly rare species.

52. ACINETA Lindl.

ACINETA Lindl. in Bot. Reg. Misc. n. s. 6:67. 1843; Benth & Hook. Gen. Pl. 3:551. 1883; Schltr. in Orchis 11:21–48. 1917.

Neippergia C. Morr. in Ann. Soc. Roy. Agr. & Bot. Gand 5:375, t. 282. 1849.

Lueddemannia Rchb. f. in Bonplandia 2:281. 1854.

Luddemania Rchb. f. in Linden, Pescatorea 1, t. 22. 1860.

Luedemannia Benth. in Benth. & Hook. Gen. Pl. 3:552. 1883.

Stout epiphytic herbs with ovoid or subcylindric, often laterally compressed or furrowed pseudobulbs, the apex with 1–4 broadly plicate leaves, the plants considerably resembling a robust *Stanbopes*. Inflorescences elongate, pendulous or erect racemes from the base of the pseudobulbs. Flowers usually many, fleshy, relatively large and conspicuous. Sepals subequal, broadly concave, the dorsal sepal free, the laterals usually connate at the base. Petals subequal to the sepals but usually smaller. Lip 3-lobed, fleshy, concave, with a concave or subsaccate, basal claw or hypochile, lateral lobes large, erect, triangular or subreniform, the apical lobe carinate, concave or spreading; disk fleshy, with variously shaped appendages. Column erect, usually pubescent, somewhat arcuate, subclavate or narrowly winged, without a foot. Anther terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 2, waxy.

A genus of robust American epiphytic orchids ranging from southern Mexico to Venezuela and Ecuador. Vegetatively they often considerably resemble a stout *Stanbopes*, but are most closely allied to *Peristeria*, although the complex structure of the lip in some species more nearly approaches that found in the former genus.

Schlechter in his monograph distinguishes 13 species, the major separations in his key being based on color. No attempt has been made to evaluate these specific concepts, except that *Acineta chrysantha* and *A. sella-turcica* seem to be one entity on the basis of the evidence now available. Of the two valid species that have been listed for Panama, only one, *A. chrysantha*, has been found in recent years. However, the wide distribution of *A. superba* in adjacent Colombia would increase the possibility that it has been, or will be found in Panama.

- a. Lip in profile with a broadly emarginate indentation or constriction below the lateral lobes, separating the hypochile from the epichile, the basal claw or hypochile subsaccate; apical lobe of the lip about 1 cm. long..... 1. *A. CHRYSANTHA*
- aa. Lip in profile deeply gibbous and continuous, without an emarginate indentation below the lateral lobes; basal claw or hypochile rectangular-concave, not subsaccate; apical lobe of the lip about 2 cm. long..... 2. *A. SUPERBA*

1. *ACINETA CHRYSANTHA* (Morr.) Lindl. & Paxt. in Paxton's Flow. Gard. 1:31. 1850-51.

Neippergia chrysantha C. Morr. in Ann. Soc. Roy. Agr. & Bot. Gand 5:375, t. 282. 1849.

Acineta densa Lindl. & Paxt. in Paxton's Flow. Gard. 1:91. 1850-51.

Acineta sella-turcica Rchb. f. in Bot. Zeit. 10:705. 1852.

Acineta Warscewiczii Kl. in Allgem. Gartenzeit. 20:145. 1852.

Robust epiphytic herbs with ovoid or subconic, somewhat laterally compressed, more or less furrowed pseudobulbs 8-10 cm. long and 6-8 cm. wide, the apex with 3-4 broad, oblanceolate, plicate, acute leaves 30-45 cm. long. Inflorescences elongate, pendulous racemes from the base of the pseudobulbs. Flowers many,

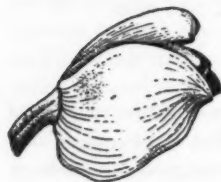


Fig. 166. *Acineta chrysantha*

fleshy, not fully expanding, subglobose, relatively large and conspicuous. Sepals fleshy, free, not spreading, yellow, concave, dorsal sepal oblong-ovate, obtuse, 2.5-3.5 cm. long and 2-2.7 cm. wide, laterals elliptic-ovate, shortly and broadly acute,

2.5-3.5 cm. long and 2-2.8 cm. wide. Petals membranaceous, obovate, acute, yellow, spotted red particularly toward the base or on the margins, 3-3.2 cm. long and 1.8-2 cm. wide. Lip very fleshy, 3-lobed, 2.5-3 cm. long and 2.5-3 cm. broad when spread out, yellow spotted red-brown, the basal claw or hypochile broadly concave or subsaccate, terminating in a short, erect, fleshy horn; lateral lobes erect, subreniform; apical lobe short, concave or spreading, subquadrate or rhombic-obovate, acute, 8-12 mm. long and 8-12 mm. wide; disk with a broad, erect, prominent callus with 2 small, lateral, subfalcate wings, the projecting carinate, apical margin with short fleshy teeth. Column stout, pubescent, 2-2.2 cm. long, the base semiterete, the apex with narrow lateral wings.

Costa Rica and Panama.

CHIRIQUÍ: Indian Hill, 5000 ft., Powell 314, 417; without definite locality, Pring s. n.

Our specimens seem to differ in minor detail, particularly in the basal fleshy callus of the disk and in the upper margin of the clinandrium, from typical material of this species; but in spite of these discrepancies, they seem to compare more nearly to *A. chrysantha* than to any other.

2. *ACINETA SUPERBA* (HBK.) Rchb. f. in Walp. Ann. 6:609. 1863.

Anguloa superba HBK. Nov. Gen. & Sp. 1:343, t. 93. 1815.

Peristeria Humboldtii Lindl. in Bot. Reg. n. s. 6: t. 18. 1843.

Acineta Humboldtii Lindl. loc. cit. Misc. 68. 1843.

Acineta fulva Kl. in Allgem. Gartenzeit. 20:146. 1852.

Acineta Colmani Hort. ex Gard. Chron. III, 35:173. 1904.

Stout epiphytic herbs with ovoid, somewhat angular pseudobulbs 7-10 cm. long and 4-6 cm. wide, the apex with 2-3 lanceolate, acute, plicate leaves 25-45 cm. long. Inflorescences elongate, pendent racemes from the base of the pseudobulbs. Flowers about 5 to numerous, fleshy, relatively large and conspicuous, not fully expanding, variable in color from pale yellow to reddish brown, with red or brownish purple spots. Sepals fleshy, concave, the dorsal sepal free, more or less erect, oblanceolate, shortly acute, 3.5-4 cm. long and 2-2.2 cm. wide, laterals connate at the base, obliquely elliptic-lanceolate, acute, 3.5-4 cm. long and 2-2.5 cm. wide. Petals membranaceous, oblanceolate-obtuse or very shortly and broadly acute, 3-3.5 cm. long and 1.8-2 cm. wide. Lip very fleshy, gibbous, 3-lobed, the basal claw or hypophylla rectangular-linear, concave, the lateral lobes erect, broadly

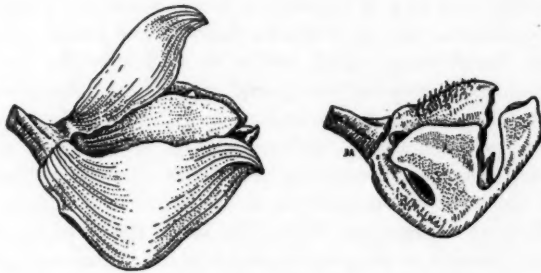


Fig. 167. *Acineta superba*

triangular, the apical lobe of the lip elongate, carinate, 1.8-2 cm. long and about 1.8-2 cm. wide when spread out, obovate, obtuse; disk with a very conspicuous, erect, oblong-quadrate, fleshy callus with 2 identical, divergent, forked processes arising from a common restricted base, the one pointing toward the apex and the other toward the base of the lip. Column stout, pubescent, 1.8-2 cm. long and 1.3-1.5 cm. wide, subterete below, narrowly winged above, the wings confluent at the apex, forming a hood over the clinandrium.

Panama?, Colombia, Venezuela, and Ecuador.

This species was first discovered by Humboldt and Bonpland in a valley called Catacocha, near Zaruma, in what is now Ecuador. It is doubtfully listed by Schlechter for Panama, although he evidently had not seen authentic specimens, nor have any been available for the preparation of this manuscript. However, its wide distribution in adjacent Colombia and northern South America would strengthen the probability that it has been found, or will be found within the limits of our area.

53. PERISTERIA Hook.

PERISTERIA Hook. in Bot. Mag. *t.* 3116. 1831; Benth. & Hook. Gen. Pl. 3:550. 1883.

Peristera Endl. Gen. Pl. 199. 1837.

Eckardia Rchb. ex Endl. Gen. Pl. Suppl. 2:17. 1842.

Epiphytic or terrestrial herbs, with stout ovoid or subconic pseudobulbs, the apex with 1-5 broad, elliptic-lanceolate, plicate leaves which are often deciduous. Inflorescences tall erect or short pendent racemes from the base of the pseudobulbs. Flowers fleshy, subglobose, relatively large and conspicuous. Sepals fleshy, subequal, broadly concave, the dorsal sepal usually free, the laterals somewhat connate at the base. Petals subequal to the sepals, but smaller. Lip very fleshy, with a broadly concave basal claw or hypochile which is adnate to or continuous with the base of the column, with or without a fleshy central callus, with or without elongate, erect, lateral wings; apical portion or epichile entire, articulated with the hypochile, inflexed or incumbent, lateral margins erect, spreading or retuse; disk with or without a fleshy ventricose or 2-keeled callus. Column erect, short, stout, subterete, without a foot, with or without elongate lateral projections. Anther terminal, operculate, incumbent, imperfectly 2-celled; pollinia 2, waxy.

About six species of robust epiphytic or terrestrial herbs ranging from Costa Rica and Panama to Surinam and Peru. The single terrestrial species, *Peristeria elata*, is the only member of the genus known to occur in Panama. All the others are South American epiphytes with pendent flower scapes reminiscent of *Acineta*.

1. PERISTERIA ELATA Hook. in Bot. Mag. *t.* 3116. 1831.

Erect, stately, terrestrial herbs. Pseudobulbs stout, fleshy, broadly ovoid, subconic or subcylindric, 4-12 cm. long and 4-8 cm. wide, the bases enveloped in several closely imbricating papery bracts, the upper 1-2 of which are foliaceous, the apex of the pseudobulb with 3-5 broadly lanceolate, plicate, acuminate, deciduous leaves 3-10 dm. long and 6-12 cm. wide; the old pseudobulbs often wrinkled, the brown, papery, imbricating, unarmed bases of the fallen leaves persistent and enveloping the apex. Inflorescences tall, solitary, erect, unbranched racemes 8-13 dm. long, produced simultaneously beside the new growth at the base of the pseudobulbs and developing concurrently with it, actual flowering being delayed until the pseudobulb has matured but before the leaves have fallen. Flowers 10-15 or more, relatively large and conspicuous, fleshy, subglobose, waxy white, strongly fragrant, opening in succession from the lowest upward, 2-4 on the raceme open at one time, relatively widely spaced, with long (about 4 cm.) pedicels, usually subtended on the scape by several to many of the developing seed capsules; the unopened buds above the flowers progressively more crowded toward the apex of the scape. Sepals subequal, fleshy, waxy white, broadly concave, the dorsal sepal free, ovate, obtuse, 2.5-3 cm. long and 2-2.5 cm. broad, laterals somewhat connate at the base, ovate or suborbicular, shortly acute, 2.5-3 cm. long and 2.5-3 cm. wide. Petals elliptic-obovate, obtuse, 20-25 mm. long

Fig. 168. *Peristeria elata*

and 15–18 mm. wide. Lip very fleshy, the claw or hypochile broad, continuous with the base of the column, the lateral margins with ascending wings which are white, heavily spotted rose-red, the inner basal surface thickened into a fleshy lobule; apical lobe of the lip, or epichile, white, articulated with the frontal margin of the hypochile, entire, subquadrate, retuse, nearly truncate, with a central glabrous, fleshy, pure white, ventricose or suborbicular crest. Column short, pure white, subconic, semiterete, 9–11 mm. long. Anther pure white, beaked, superficially resembling the head of a bird.

Costa Rica, Panama, Colombia, and Venezuela.

PANAMÁ: hills near Juan Díaz, sea level, *Powell* 213; without definite locality, *Pring* s. n.; llanos east of Panama City near Río Tecúmen, 100 ft., *Allen* 5144; Chorrera llanos, 50 ft., *Allen* 5145; Cerro Campana, rocky outcrops, 2000 ft., *Allen* 5071. COLÓN: Cerro Santa Rita, in grass along roads, 1200 ft., *Dorothy Allen* 5138. COCLÉ: El Valle de Antón, 1800 ft., *Allen* 5072.

This handsome species is the famous "Holy Ghost" or "Dove Orchid," the national flower of the Republic of Panama. The popular names are suggested by the form of the column, its beaked anther and the lateral winged lobes of the basal claw combining to produce within the waxy white flower a figure resembling that of a dove. The plants are found at low to medium elevations in shaded situations on the margins of grasslands and on rocky outcrops in forest, having been in former times very plentiful in the Canal Zone area. Commercial collecting has now made this an increasingly infrequent plant of the more inaccessible parts of the interior.

54. NEOMOOREA Rolfe

NEOMOOREA Rolfe, in *Orch. Rev.* 12:30. 1904.

Moorea Rolfe, in *Gard. Chron.* III, 8:7. 1890, non Lem.

Epiphytic herbs with stout ovoid pseudobulbs, the apex with 2 elliptic-lanceolate, acute or shortly acuminate, plicate leaves, the plants resembling a very robust *Stanhopea*. Inflorescences erect or arching racemes from the base of the pseudobulbs. Flowers relatively large and conspicuous. Sepals subequal, free, spreading. Petals subequal to the sepals but narrower at the base. Lip deeply 3-lobed, articulated to the foot of the column, lateral lobes large, spreading, subreniform, mid-lobe concave, lanceolate-acuminate, basal crest shortly pedicellate, with 2 lateral erect or spreading wings. Column subclavate, semiterete, somewhat arcuate, not winged, produced at the base into a short, broad foot. Anther terminal, incumbent, operculate; pollinia 4, waxy, in 2 unequal pairs.

A rare monotypic genus, previously known only from Colombia.

1. NEOMOOREA IRRORATA Rolfe, in *Orch. Rev.* 12:30. 1904.

Moorea irrorata Rolfe, in *Gard. Chron.* III, 8:7. 1890.

Erect epiphytic herbs; the primary roots with many erect, white, spinous secondary rootlets which form a dense mat about the base of the plant. Pseudobulbs stout, ovoid, laterally compressed, furrowed, 4–11 cm. long and 2.5–6 cm. wide, the apex with 2 elliptic-lanceolate, plicate, acute or shortly acuminate, strongly veined, subcoriaceous leaves 45–75 cm. long and 10–13 cm. wide. Inflorescences erect or arching racemes 15–45 cm. long, from the base of the pseudobulbs. Flowers few to about 12, relatively large and conspicuous. Sepals subequal, free, spreading, concave, reddish brown, the bases white, the dorsal sepal elliptic-lanceolate, acute, 2–2.5 cm. long and 1–1.2 cm. wide, laterals elliptic-ovate, acute, 2.2–2.8 cm. long and 1.6–1.8 cm. wide. Petals elliptic-obovate, acute, reddish brown with a white base, 2.2–2.5 cm. long and 1.2–1.4 cm. wide. Lip deeply 3-lobed, articulated to the short column foot, 1.4–1.6 cm. long and 1.5–1.7 cm. wide when spread out, lateral lobes large, spreading, subreniform, pale yellow, banded and marked with brownish purple, mid-lobe concave, lanceolate-acuminate, pale yellow spotted red; basal crest conspicuous, erect, shortly pedicellate, with two lateral, erect, subfalcate wings. Column subclavate, somewhat arcuate, not winged, 12–14 mm. long, the base with a short, broad foot.

Panama and Colombia.

CANAL ZONE (?): exact locality unknown, probably Gatún Lake or the vicinity of Río Trinidad, *Hunter s. n.*

A rare Colombian species known in Panama from a few collections of sterile plants from the vicinity of the Río Trinidad, on Gatún Lake, and a single flowering specimen collected and photographed by Mr. A. A. Hunter.

54-A. POLYCYCNIS Rchb. f.

POLYCYCNIS Rchb. f. in Bonplandia 3:218. 1855; Benth. & Hook. Gen. Pl. 3:553. 1883.

Erect epiphytic herbs, the plants somewhat resembling a *Stanbopea*. Pseudobulbs ovoid or subcylindric, the bases enveloped in sheathing bracts, the apex with 1–3 broadly elliptic-lanceolate, plicate leaves. Inflorescences elongate, arching or pendulous racemes from the base of the pseudobulbs. Flowers numerous, membranaceous, pedicellate, somewhat reminiscent of those of a *Gongora*. Sepals subequal, narrowly elliptic-lanceolate, free, or the laterals connate at the base, spreading or reflexed. Petals subequal to the sepals but narrower, sometimes with an elongate, substipitate base. Lip usually with a 3-lobed basal claw or hypochile which is adnate to the base of the column, the lateral lobes erect or spreading, the apex usually hirsute or pubescent; the base of the epichile inserted on the under-surface of the hypochile well back of the apex, producing the effect in some species of a double lip; epichile entire or obscurely 3-lobed, subcordate, obovate or lanceolate, obtuse, acute or acuminate, lateral lobes, if present, subauriculate and spreading; disk often hirsute or pubescent. Column slender, footless, elongate, arcuate, terete below, dilated and truncate above. Anther terminal, operculate, incumbent, 1-celled; pollinia 2, waxy.



Fig. 169. *Polycynis barbata*

About 7 species of American epiphytic herbs, ranging from Costa Rica to Brazil and Peru, only one being thus far known from Panama. *Polycycnis gratiosa* Rchb. f., from adjacent Costa Rica, seems to differ from our species only in the somewhat smaller flowers and the subfalcate, rather than obtuse, lateral auricles of the hypochile, characters scarcely warranting specific segregation. For the purposes of this treatment they are considered as being identical.

1. *POLYCYCNIS BARBATA* (Lindl.) Rchb. f. in Bonplandia 3:218. 1855.

Cynoches barbatum Lindl. in Jour. Hort. Soc. Lond. 4:268. 1849.

Polycycnis gratiosa Endres & Rchb. f. in Gard. Chron. 1451. 1871.

Epiphytic herbs with ovoid, ridged pseudobulbs 2.5–4.5 cm. long and 1.8–2.5 cm. wide, bearing at the apex a single elliptic-lanceolate, plicate, acute or acuminate leaf 25–40 cm. long and 4–10 cm. wide. Inflorescences arching or pendent racemes 28–32 cm. long, from the base of the pseudobulbs, the rachis minutely pubescent. Flowers many, membranaceous, relatively large, on elongate pubescent pedicels. Sepals subequal, spreading or reflexed, concave, pale translucent yellow spotted red, the dorsal sepal free, lanceolate-acuminate, 17–25 mm. long and 6–8 mm. wide when spread out, laterals somewhat obliquely lanceolate, acuminate, connate at the base, 18–24 mm. long and 6–8 mm. wide. Petals narrowly oblanceolate, with slender substipitate bases, pale translucent yellow spotted red, 18–24 mm. long and 2.5–3 mm. wide. Lip with a 3-lobed basal claw or hypochile adnate to the base of the column, white spotted red, 7–9 mm. long, the lateral lobes auriculate-obtuse or subfalcate, acute, erect; the apex of the hypochile with a central, densely pubescent, carinate projection; epichile obscurely 3-lobed, white spotted purple, ovate, acuminate, lateral lobes subauriculate and spreading; the base of the epichile inserted about midway on the under-surface of the hypochile, producing the effect of a double lip, one slightly above and behind the other; disk densely pubescent. Column slender, green, footless, arcuate, terete below, dilated and truncate above, 1.8–2.2 cm. long. Anther purple.

Costa Rica, Panama, Colombia, Venezuela, and Brazil.

COCLÉ: crest of Cerro Pajita, hills north of El Valle de Antón, 3600 ft., Allen 4314.

55. *STANHOPEA* Frost ex Hook.

STANHOPEA Frost ex Hook. in Bot. Mag. t. 2948, 2949. 1829; Benth. & Hook.

Gen. Pl. 3:549. 1883.

Ceratobilus Lindl. in Lodd. Bot. Cab. 15: t. 1414. 1828, non Blume.

Stanhopeastrum Rchb. f. in Bot. Zeit. 10:927. 1852.

Epiphytic herbs with ovoid or subcylindric, more or less ridged pseudobulbs, the apex with a single broad, petiolate, plicate, strongly veined, elliptic-lanceolate leaf. Inflorescences short, pendulous racemes from the base of the pseudobulbs, the rachis enveloped in several broad, papery, imbricating bracts. Flowers usually

large, conspicuous, 2 to about 9, on long pedicels, each shielded by a broad, papery, spathaceous bract. The genus is divided into two very distinct sections, *ECORNUTA* and *EUSTANHOPEA*, based on the structure of the lip. In both sections sepals membranaceous and concave, the dorsal sepal free and erect, the laterals broader, reflexed and connate at the base. Petals membranaceous, subequal to the dorsal sepal, but usually narrower, with undulate margins. In *ECORNUTA*: lip essentially simple and undivided, adnate to the base of the column, with an inflated, very fleshy, saccate or calceiform, basal claw or hypochile, surmounted by a much-reduced and confluent apical lobe. In *EUSTANHOPEA*: fleshy lip complexly 2- or 3-parted, inserted on the base of the column, usually divided into a subsaccate or cymbiform, basal claw or hypochile, with or without short, broad teeth on the inner margins of the basal concavity; a short mid-section or mesochile sometimes simple but more frequently with short or elongate, usually falcately incurved, acuminate, lateral horns, and an apical lobe or epichile which usually is articulated to the apex of the mesochile, entire and spreading, or 3-lobed and variously shaped. In both sections column elongate, somewhat arcuate, with or without broad lateral wings. Anther terminal, operculate, incumbent, 1-celled; pollinia 2, waxy.

A remarkable genus mostly of large-flowered American epiphytes, ranging from southern Mexico to Peru and Brazil. Many species have been described, often based on inadequate dried material or isolated specimens flowering in European greenhouses. Undoubtedly comparison of type material would reduce the present inflated list of names to about eight valid species. So far as can be determined from available material, four entities have been found thus far in Panama.

- a. Lip simple, undivided (Section *ECORNUTA*) 3. *S. PULLA*
- aa. Lip complexly 3-parted (Section *EUSTANHOPEA*)
 - b. Hypochile cymbiform, broadly elliptic-lunate in profile, distinctly longer than broad, the inner margins of the basal concavity entire.... 2. *S. OCULATA*
 - bb. Hypochile inflated, saccate or subsaccate, geniculate or broadly obovate in profile, about as long as broad, or scarcely longer, the inner margins of the basal concavity with short, broad teeth.
 - c. Hypochile in profile geniculate, somewhat longer than broad, the apex oblique, the lateral margins of the canal closely appressed..... 4. *S. WARDII*
 - cc. Hypochile in profile obovate, not geniculate, about as broad as long, the apex abruptly truncate and concave, the lateral margins of the canal spreading 1. *S. GRAVEOLENS*

1. *STANHOPEA GRAVEOLENS* Lindl. in Bot. Reg. n. s. 3: Misc. 59. 1840.

Stanhopea Warscewicziana Kl. in Allgem. Gartenzeit. 20:214. 1852.

Stanhopea inodora Rchb. f. Xenia Orch. 1:121. 1858, non Lodd.

Stanhopea costaricensis Rchb. f. in Hamb. Gartenzeit. 16:424. 1860.

Stanhopea oculata var. *constricta* Klinge. in Acta Hort. Petropol. 17:15, t. 3, fig. 26-27. 1898.

Erect epiphytic herbs, with ovoid, ridged, subconic pseudobulbs 2.5-4 cm. long and 2-3 cm. wide, the apex with a single firm, lanceolate to elliptic-lanceolate,

plicate, acute leaf 28–60 cm. long and 7–11 cm. wide. Inflorescences short, pendulous, from the base of the pseudobulbs, the rachis enveloped in several papery, spathaceous bracts. Flowers large and conspicuous, very fragrant, white, pale yellow, or yellow with reddish brown or purple dots, the sepals and petals often with more or less circular rings, the base of the hypochile with or without 2 lateral dark purple "eyes" or blotches. Sepals membranaceous, the dorsal sepal free, erect, concave, lanceolate, acute, 6–7.5 cm. long and 1.4–1.6 cm. wide, laterals reflexed, connate at the base, elliptic-lanceolate, acute, 6–7.5 cm. long and 2–3 cm. broad. Petals membranaceous, reflexed, with undulate margins, lanceolate, acute or acuminate, 4.5–5.5 cm. long and 1.0–1.8 cm. wide. Lip fleshy, complexly 3-parted, 5–6 cm. long, the hypochile broadly inflated, obovate in profile, not geniculate, abruptly truncate and concave at the apex, about as broad as long, the lateral margins with broadly falcate thickenings, the canal to the basal concavity ample, the margins not closely appressed; mesochile short, inserted on the concave apex of the hypochile, the lateral margins with 2 elongate, falcate, acuminate, incurved horns; epichile articulated with the apex of the mesochile, elliptic-ovate, acute or apiculate, with more or less reflexed margins. Column elongate, arcuate, terete below, the apical half broadly winged, 4.5–6 cm. long.

Mexico, Costa Rica, Panama, and Brazil, and probably adjacent areas.

PANAMÁ: hills east of city, near San Juan, sea level, *Powell* 295; McComber Hill, sea level, *Powell* 302; Cerro Campana, 2000 ft., *Allen* 4557. CANAL ZONE: Pedro Miguel, sea level, *Powell* 303.

This species has previously been known in Panama under the name of *Stanbopea Bucephalus*, but unfortunately this must now be listed as a synonym of *S. oculata*. The plants within our area seem for the most part to be confined to the lowlands of both coasts. The fragrant flowers are variable in color, and usually are produced in May and June, lasting only two or three days.

2. *STANHOPEA OCULATA* (Lodd.) Lindl. Gen. & Spec. Orch. Pl. 158. 1832, as to basynym, but not as to plant described.

Ceratocbilus oculatus Lodd. Bot. Cab. 18: t. 1764. 1831.

Stanbopea Bucephalus Lindl. Gen. & Sp. Orch. Pl. 157. 1832.

Epiphytic herbs with short, ovoid, subconic pseudobulbs bearing at the apex a single broad, plicate, petiolate, subcoriaceous, elliptic-lanceolate, acute leaf 35–50 cm. long and 8–12 cm. wide. Inflorescences short pendulous racemes typical of the genus. Flowers 2–4, large, creamy white (in our specimens). Sepals membranaceous, the dorsal sepal free, erect, elliptic-lanceolate, concave, acute, 6.5–7.5 cm. long and 1.8–3.5 cm. wide, laterals somewhat connate at the base, reflexed, rather obliquely elliptic-lanceolate, acute, 6–7.5 cm. long and 2–3.5 cm. wide. Petals membranaceous, reflexed, linear-lanceolate, acuminate, 5–6.5 cm. long and 1.1–1.5 cm. wide. Lip fleshy, elongate, 4.5–6.5 cm. long; the hypochile cymbiform, deeply concave, with slender, elongate, falcate thickenings on the lateral

margins, in profile broadly elliptic-lunate, about twice as long as broad (in fresh material), or slightly undulate and about 4 times as long as broad (in dried material), the margins of the canal to the basal concavity closely appressed; the mesochile short, inserted on the apex of the hypochile, with 2 lateral, slender, falcate, incurved, elongate horns; the epichile articulated with the apex of the mesochile, obovate, abruptly apiculate. Column elongate, arcuate, semiterete below, broadly winged above, 5-6.5 cm. long.

Mexico and Panama, and probably adjacent Central and South America.

COCLÉ: region north of El Valle de Antón, 1000 m., *Fairchild s. n.*, *Allen 2931*.

This very striking and handsome species has been found thus far in our area only in the wet highland forests north of El Valle de Antón, in Coclé Province, where the plants seem to be confined to the tops of the tallest trees. The flowers in our specimens were produced in June, being unusually large, and pure creamy white. There seems to be no doubt that the present confusion of names has in considerable part arisen from the unfortunate circumstance that Lindley, while transferring *Ceratocbilus oculatus* Lodd. (*Bot. Cab. t. 1764*. 1831) to the genus *Stanhopea*, in his accompanying description (*Gen. & Spec. Orch. Pl.* 158. 1832) actually gave the basic characters of the then undetected *Stanhopea Wardii*, and also (*ibid.* 157. 1832) re-described the Loddiges plant under the name of *Stanhopea Bucephalus*.

3. *STANHOPEA PULLA* Rchb. f. in *Gard. Chron.* n. s. 7:810. 1877.

Erect epiphytic herbs. Pseudobulbs short, stout, ovoid, subconic, somewhat wrinkled, often nearly black, 2.5-3.5 cm. long and 2-2.5 cm. wide, enveloped in 3-4 fibrous, brown, papery bracts, the apex with a single elliptic-lanceolate, long-petiolate, plicate, acute or acuminate leaf 40-60 cm. long and 7-10 cm. wide. Inflorescences very short, pendent, produced from the base of the pseudobulbs, the rachis enveloped in several closely imbricating papery bracts, the apical 2-3 of which are expanded and spathaceous, 3-3.5 cm. long and 1.5-2.0 cm. broad, arching over the flowers. Flowers the smallest known for the genus, usually 2, which face each other on the scape. Sepals membranaceous, pale yellow, concave, the dorsal sepal free, erect, elliptic-lanceolate, acute, 20-30 mm. long and 10-20 mm. wide when spread out; laterals connate at the base, reflexed, ovate to broadly subfalcate, acute, 2.5-3.5 cm. long and 1.5-2.5 cm. broad. Petals membranaceous, reflexed, yellow, ligular, abruptly acute, 2-3 cm. long and .8-1.2 cm. wide. Lip very fleshy, waxy, simple, undivided, tan marked and margined with red-brown, the body composed of the hypochile, which is broadly inflated at the base and adnate to the base of the column, 18-25 mm. long and 18-20 mm. broad, lateral margins more or less erect, the ventral surface of the apex of the hypochile broadly concave; the inner disk with an elongate, more or less prominent, central, reddish-brown keel, terminating at the apex in a short, subcordate acute, fleshy boss confluent with the apex of the hypochile. Column somewhat arcuate, 1.8-2 cm. long, semiterete, without broad lateral wings.

Fig. 170. *Stanhopea Wardii*

Costa Rica and Panama.

CANAL ZONE: vic. Gatún, sea level, *Butcher s. n.* COCLÉ: El Valle de Antón, 800 m., *Cope s. n.* VERAGUAS: Cerro Tuté, region west of Santa Fé, 2500–3000 ft., *Fairchild s. n.*, *Allen 4507*, 5200.

Apparently a frequent species, to be expected in areas of low to moderate elevation of the Atlantic slope and adjacent high-rainfall portions of the Pacific watershed. Thus far, the species seems to be most frequent in the mountains west of Santa Fé, in Veraguas Province. The flowers are quite variable in size and to a lesser degree in structure.

4. *STANHOPEA WARDII* Lodd. ex Lindl. Sert. Orch. t. 20. 1838.

Stanhopea aurea Lodd. ex Lindl. in Bot. Reg. n. s. 4: Misc. 11. 1841.

Stanhopea venusta Lindl. loc. cit. 1841.

Stanhopea amoena Kl. in Allgem. Gartenzeit. 20:273. 1852.

Erect epiphytic herbs, the plants nearly identical with those of *Stanhopea graveolens*. Pseudobulbs short, ovoid, the apex with a single broad plicate, petiolate leaf. Flowers relatively large, on short or somewhat elongate, pendent racemes from the base of the pseudobulbs. Sepals membranaceous, concave, pale yellow dotted brownish purple, the dorsal sepal free, erect, elliptic-lanceolate, acute or apiculate, 4.5–6 cm. long and 1.5–2.5 cm. wide, laterals somewhat connate at the base, reflexed, elliptic-lanceolate, acute, 4.5–6 cm. long and 2–3 cm. wide. Petals pale yellow, dotted brownish purple, reflexed, with undulate margins, lanceolate-acuminate, 4–5 cm. long and .8–1.5 cm. wide. Lip very fleshy, complexly 3-parted, 4.5–5 cm. long; the hypochile inflated, subsaccate, inserted on the base of the column, with 2 large, lateral, purple-brown spots, in profile geniculate or subgeniculate, with (in fresh material) a deeply emarginate, central constriction (in fresh material somewhat longer than broad, in dried material about twice as long as broad), with a more or less pronounced gibbose swelling about the middle of the lower surface; the lateral margins with falcate, acuminate thickenings the bases of which, above the basal concavity, are produced into two short, broad, rather obscure teeth; mesochile short, pale yellow, inserted on the apex of the hypochile, with 2 elongate, acuminate, incurved, falcate horns; epichile pale yellow, articulated to the apex of the mesochile, ovate, acute, concave, with somewhat reflexed margins. Column somewhat arcuate, subterete below, broadly winged above, 4–4.5 cm. long.

Mexico, Guatemala, Costa Rica, Panama, and probably also adjacent areas in Central and South America.

COCLÉ: El Valle Chiquito, 1800 ft., *Allen 5123*; Río Mata Ahogado, 1500 ft., *Allen 5070*; El Valle de Antón, 2000 ft., *Fairchild s. n.* CHIRIQUÍ: without definite locality, 4000 ft., *Powell 103*.

A common, attractive species, closely allied to *Stanbopsea oculata*, found in Panama throughout the intermediate highlands of the Pacific slope. The fragrant flowers usually are produced in August and September, lasting about two or three days.

56. GONGORA Ruiz & Pavon

GONGORA Ruiz & Pavon, Fl. Peruv. & Chil. Prodr. 117, t. 25. 1794; Benth. & Hook. Gen. Pl. 3:549. 1883; Pfitz. in Engler & Prantl, Pflanzenfam. 2:169. 1888.

Acropera Lindl. Gen. & Sp. Orch. Pl. 172. 1833.

Epiphytic herbs. Pseudobulbs stout, ovoid, ridged, the bases enveloped in 2-3 fibrous, imbricating bracts, the apex with 2-3 broad, plicate, petiolate, elliptic-lanceolate leaves. Inflorescences usually elongate, pendent racemes from the base of the pseudobulbs. Flowers few to many, relatively large, on long pedicels. The genus has been divided by Pfitzer into the two sections ACROPERA and EUGONGORA. In section ACROPERA: pedicels usually strongly arcuate; the lateral sepals about as broad as long, spreading or somewhat reflexed, the apex broadly acute or obtuse and abruptly apiculate; the sepals and petals all more or less connivent at the base; the lip with a narrow, short or elongate, ligular basal claw; the mesochile conspicuously lobed or inflated and saccate, rarely with apical horns or antennae; the epichile elongate, lanceolate-acuminate, sometimes reduced to an obscure apicule, or divided and biligular at the apex; column slender and somewhat arcuate, dilated at the apex, sometimes narrowly winged and obscurely 2-cornute, produced at the base into a foot. In section EUGONGORA: pedicels usually straight or slightly curved; the lateral sepals usually nearly twice as long as broad, strongly reflexed, the apex acuminate, the margins strongly reflexed, the bases inserted on the foot of the column; the dorsal sepal and the petals inserted on the upper column, their bases not connivent with those of the lateral sepals; the lip very fleshy, often laterally compressed, complexly 2-parted, with both a well developed hypochile and epichile; the base of the hypochile with or without short, lateral, rounded, ligular or auriculate callosities, the apical margin usually with 2 slender, erect antennae; the epichile usually with a gibbose or conical, basal projection above the basal constriction; column slender and somewhat arcuate, semiterete below, dilated above, without lateral wings, but with the inserted petals resembling steldia; the base of the column produced into a foot. In both sections of the genus the anther is terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 2, waxy.

A perplexing genus of American epiphytes ranging from southern Mexico to Peru and Brazil. The flowers are of exceedingly complex structure, in many cases almost impossible to describe, yet all too often type descriptions are unaccompanied by figures or if the figures are given they prove to be inadequate in one or several

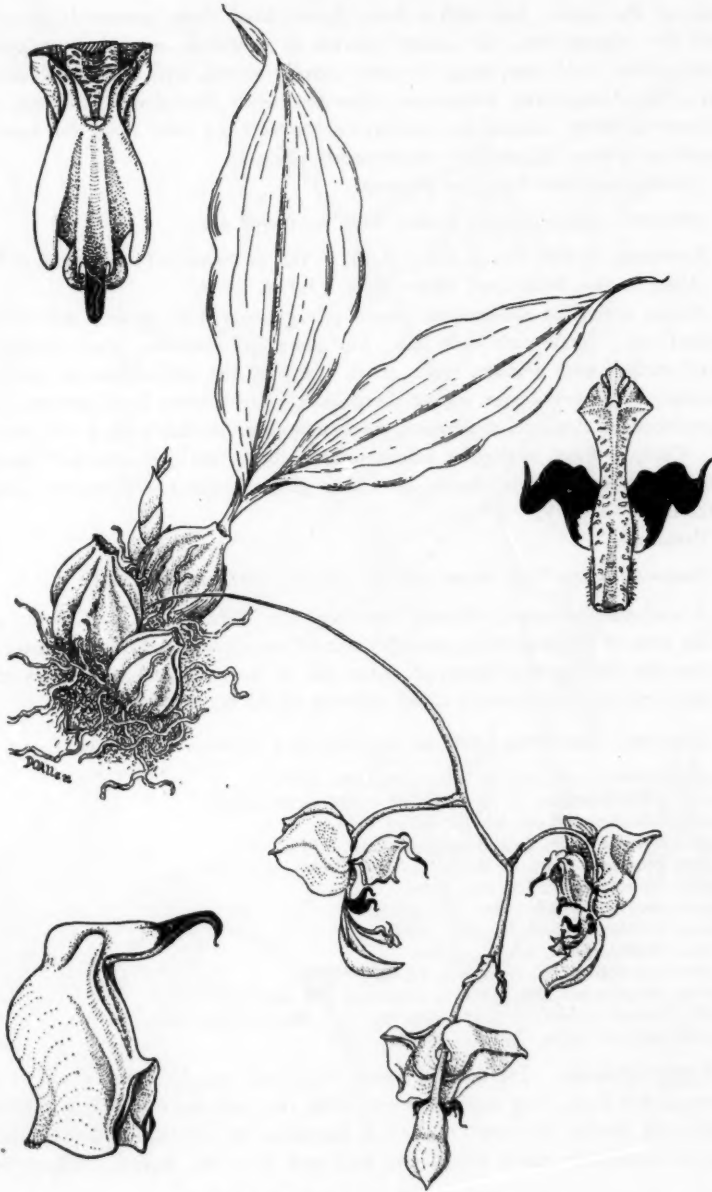
critical details. Of the many published names, perhaps about a dozen fairly well-marked entities can be segregated, but even these often are subject to a considerable amount of variation. The treatment of variants of this type is a matter of individual opinion, past practice usually having been to regard them as distinct species which appear in the literature as of equal value. The principal objection to such a method is that it does nothing to express the often very apparent relationships of many of these so-called species to each other. Many groups of entities are found to be identical in nearly every major detail, often having, shall we say, a strong "family" resemblance, and differing only in the absence or presence or development of some one or two structural details. It would seem the obvious course to accentuate these similarities, rather than to obscure them. For the purposes of this treatment, it is proposed therefore to treat these relatively less important deviations from established types as varieties. On this basis, two species, and three well-marked varieties thus far have been found in Panama.

- a. Bases of all 3 sepals connivent (Section ACROPERA)
 - b. Apex of the mesochile with 2 short lateral horns..... 2. *G. ARMENIACA*
var. *BICORNUTA*
 - bb. Apex of the mesochile without 2 short lateral horns..... 1. *G. ARMENIACA*
- aa. Base of the dorsal sepal inserted on the upper column, not connivent with the bases of the lateral sepals (Section EUGONGORA).
 - b. Hypochile when seen from above relatively narrow, the base with lateral ligular projections 3. *G. MACULATA*
 - bb. Hypochile when seen from above relatively broad, the base auriculate or with short lateral fleshy rounded horns.
 - c. Basal callosities of the hypochile auriculate..... 4. *G. MACULATA*
var. *LATIBASIS*
 - cc. Basal callosities of the hypochile short, fleshy, rounded horns..... 5. *G. MACULATA*
var. *TRICOLOR*

1. *GONGORA ARMENIACA* (Lindl.) Rchb. f. *Xenia* Orch. 1:52. 1854.

Acropera armeniaca Lindl. & Paxt. in Paxton's Flow. Gard. 1:94. 1850-51.
Acropera cornuta Kl. in Allgem. Gartenzeit. 20:186. 1852.

Erect epiphytic herbs. Pseudobulbs ovoid, ridged, often somewhat laterally compressed, 2-4.5 cm. long and 1.5-2.5 cm. wide, the bases enveloped in 2-3 papery, imbricating bracts, the apex with 2 elliptic-lanceolate, plicate, acuminate leaves 10-22 cm. long and 2-4.5 cm. wide. Inflorescences more or less elongate, pendent racemes from the base of the pseudobulbs. Flowers usually many, somewhat variable in structure, relatively large and conspicuous. Sepals membranaceous, the bases all connivent, yellow, orange, or salmon, sometimes with purple-brown spots, dorsal sepal erect, concave, elliptic-oblong and acute to broadly rectangular and obtuse or shortly apiculate, 12-18 mm. long and 6-12 mm. wide, laterals spreading or reflexed, their bases inserted on the column foot, obliquely ovate, acute or obtuse and shortly apiculate, 15-17 mm. long and 12-14 mm. broad. Petals membranaceous, pale salmon or orange, lanceolate and abruptly acuminate, or subfalcate and acuminate, 4-6 mm. long and 2.5-3 mm. wide, the attenuate apices usually recurved, the bases broadly spreading and connivent with

Fig. 171 *Gongora armeniaca* var. *bicornuta*

(397)

those of the sepals. Lip with a short, ligular basal claw, apparently articulated with the column foot, the central portion or mesochile inflated, subcalceiform, waxy yellow, 8–12 mm. long, the apex broadly obtuse, with a short or elongate, erect, linear-lanceolate, acuminate projection 6–10 mm. long. Column erect, semi-terete below, dilated and subclavate above, 9–11 mm. long, the base produced into a foot. Rostellum conspicuously elongate.

Nicaragua, Costa Rica, and Panama.

CHIRIQUÍ: without definite locality, 4500 ft., *Powell 432*.

2. *GONGORA ARMENIACA* (Lindl.) Rchb. f. var. *BICORNUTA* C. Schweinf. & P. H. Allen, in Bot. Mus. Leaf. Harv. Univ. 13:139. 1948.

Plants typical of the species. Sepals pale cream-yellow, densely and minutely spotted red. Petals rich dark red. Lip elongate-calceiform, waxy orange, the dorsal surface with a short, erect, acute lobe near the conjunction of the broad posterior margins, the apex with 2 short, lateral, fleshy horns from between which is produced an elongate, acuminate, erect, orange projection with a rich dark red tip. Column erect, subligular below, dilated above, the apex obscurely winged, with two short pointed horns on either side of the conspicuously elongate rostellum.

Panama.

VERAGUAS: Cerro Tuté, region west of Santa Fé, 3000 ft., *Allen 4648*.

A well-marked variety differing from the type in the presence of 2 fleshy horns on the apex of the mesochile, on either side of the slender central acuminate projection, the short pointed horns on either side of the rostellum at the apex of the column, and in the apparently richer coloring of the floral parts.

3. *GONGORA MACULATA* Lindl. in Bot. Reg. n. s. 6:196, t. 1616. 1833.

Gongora nigrita Lindl. loc. cit. Misc. n. s. 2:59. 1839.

Gongora leucocbila Lem. in Fl. des Serres 1:207, t. 37. 1845.

Gongora odoratissima Lem. loc. cit. 2:229. 1847.

Gongora retrorsa Rchb. f. in Bonplandia 2:19. 1854.

Gongora Bootbiana Hort. ex Rchb. f. Xenia Orch. 1:54. 1854.

Gongora Jenischii Hort. loc. cit. 1854.

Gongora quadricornis Hort. loc. cit. 1854.

Gongora Shepberdii Hort. loc. cit. 1854.

Gongora vitellina Hort. loc. cit. 1854.

Gongora superflua Rchb. f. loc. cit. 2:169. 1873.

Gongora truncata var. *alba* Nash, in Addisonia 2: t. 46. 1917.

Gongora Powellii Schltr. in Fedde, Rep. Sp. Nov. Beih. 17:62. 1922.

Gongora unicolor Schltr. loc. cit. 19:229. 1923.

Epiphytic herbs. Pseudobulbs erect, clustered, ovoid, strongly ridged and sulcate, 4.5–6.5 cm. long and 2–3.5 cm. wide, the bases enveloped in 2–3 fibrous, imbricating bracts, the apex with 2–3 lanceolate or elliptic-lanceolate, plicate, acute or acuminate leaves 25–40 cm. long and 5–11 cm. broad. Inflorescences

Fig. 172. *Gongora maculata*

(399)

elongate, pendulous racemes from the base of the pseudobulbs. Flowers many, grotesque, strongly fragrant, relatively large, on elongate, slender, nearly straight pedicels. Sepals membranaceous, pale yellow, spotted or banded reddish brown (in our specimens), dorsal sepal free, erect, the base inserted about midway on the column, lanceolate, acuminate, the margins often strongly recurved, 1.5–1.8 cm. long and .4–.6 cm. wide, the base not connivent with the bases of the lateral sepals, lateral sepals strongly reflexed, inserted on the column foot, obliquely ovate, acuminate when spread out, the lateral margins strongly recurved, 20–25 mm. long and 9–14 mm. wide. Petals colored similarly to the sepals, resembling stelia, the bases inserted on the column and connivent with the base of the dorsal sepal, linear-lanceolate, acuminate, the attenuate apices somewhat recurved, 6–8 mm. long and 1–2 mm. broad. Lip fleshy, 1.5–2 cm. long, pale yellow, marked reddish brown (in our specimens), complexly 2-parted, the short, ligular, basal claw apparently articulated with the column foot; the hypochile saccate, of 2 complex, erect, lateral lobes, the upper closely appressed margins of which combine to form a dorsal keel, the hypochile when seen from above with 2 slender, lateral, ligular, somewhat recurved projections from the base, the apex in profile abruptly truncate and deeply concave, with two lateral erect elongate antennae prolonged into short acuminate teeth; the epichile laterally compressed, about as long as the hypochile, subsaccate and gibbose above the basal constriction, the apex in profile cuneate, with an attenuate recurved tip. Column erect, somewhat arcuate, 15–20 mm. long, terete below, somewhat dilated and subclavate above the point of insertion of the dorsal sepal and petals.

Mexico, British Honduras to Brazil and Ecuador.

CANAL ZONE: Mojinga Swamp, near the mouth of the Río Chagres, sea level, *Allen* 870; Ancon, in hospital grounds, sea level, *Pittier* 6627, 6630. PANAMÁ: Matías Hernández, east of Panama City, sea level, *Pittier* 6630; hills east of Panama City, sea level, *Powell* 63, 70, 76, 176. COLÓN: forests along the Río Boquerón, above the Peluca Hydrographic Station, 90 m., *Hunter & Allen* 649 (in part). COCLÉ: El Valle de Antón, 500–700 m., *Hunter & Allen* 352; El Valle Chiquito, 600 m., *Dunn* s. n.; region north of El Valle de Antón, 800 m., *Allen* 2943; mountains beyond La Pintada, 400–600 m., *Hunter & Allen* 647. BOCAS DEL TORO: Water Valley, vic. Chiriquí Lagoon, *von Wedel* 1472.

This common and widely distributed species is found in damp shaded locations at low to moderate elevations throughout our range. It seems possible that this may be the species described by Ruiz & Pavon as *Gongora quinquenervis*, but their description is obscure and entirely inadequate, and a photograph of the type shows it to have been based on fruiting material only; hence it has been considered best to adopt the next available name. As would be expected in a species having such a tremendous geographic range, the flowers in other areas are variable in color and to a lesser degree in size. In Panama, the flowering season is from November to May, individual plants usually producing two or more successive inflorescences.

- 4 GONGORA MACULATA Lindl. var. LATIBASIS C. Schweinf. & Allen, in Bot. Mus. Leaflet. Harv. Univ. 13:144. 1948.

Vegetative material not seen. Pseudobulbs described as round and deeply grooved, about 5 cm. wide, the apex with 2 grayish green leaves 30 cm. long and 10 cm. wide. Sepals membranaceous, dark blood-red, the dorsal sepal erect, inserted on the column, elliptic-lanceolate, acute, 2-2.2 cm. long and 1.2-1.4 cm. broad, the lateral sepals inserted on the column foot, strongly reflexed, obliquely ovate, shortly acuminate, the lateral margins strongly recurved, about 3 cm. long and 2 cm. broad when spread out. Petals inserted on the column, their bases connivent with the base of the dorsal sepal, light green spotted red, linear-lanceolate, acuminate, subfalcate, the attenuate apices incurved, 12-14 mm. long and about 2 mm. broad. Lip very fleshy, complexly 2-parted, dark blood-red; the hypochile when seen from above about 2 cm. long and 1.3 cm. broad at the abruptly truncate base, the lateral lobes broadly auriculate; the apex of the hypochile, seen in profile, with 2 erect, slender antennae prolonged below as short, acute teeth; the epichile typical of the species, except for the basal projection, which in this case is prolonged into an almost conical spur.

Panama.

COLÓN: about 2 miles west of Gatún Dam, 600 ft., *Butcher s. n.*

A very striking and well-marked variety, differing from the type in the larger, more richly colored flowers, the broader, auriculate base of the hypochile, and the prolonged subconic projection at the base of the epichile.

5. GONGORA MACULATA Lindl. var. TRICOLOR Lindl. in Bot. Reg. n. s. 10: t. 69. 1847.

Gongora fulva Lindl. loc. cit. 2: t. 57. 1839.

Gongora bufonia Lindl. loc. cit. 4: t. 2. 1841.

Plants identical with those of the type. Sepals rich yellow to orange, usually spotted or blotched dark red or dark purple. Petals greenish yellow, usually spotted or marked dark red. Lip very fleshy, complexly 2-parted, rich yellow or orange, usually marked dark red, or dark purple. The hypochile when seen from above with a relatively broad base, with two short, fleshy, rounded horns on each side, otherwise identical with the type.

Panama and Peru, and probably adjacent territory.

CANAL ZONE: Mojinga Swamp, near the mouth of the Río Chagres, sea level, *Allen 911*. PANAMÁ: foothills east of Panama City, sea level, *Powell 32, 69, 71, 93*. COLÓN: forests along the Río Boquerón, above the Peluca Hydrographic Station, about 90 m., *Hunter & Allen 649* (in part), 650. COCLÉ: El Valle de Antón, 1800 ft., *Fairchild s. n.*

Distinguished from the type by the somewhat larger, more richly colored flowers, the somewhat broader base of the hypochile, and the rounded, fleshy, basal horns.

57. CORYANTHES Hook.

CORYANTHES Hook. in Bot. Mag. t. 3102. 1831; Benth. & Hook. Gen. Pl. 3:549. 1883; Schltr. in Orchis 10:67-82. 1916.

Meliclis Raf. Fl. Tellur. 2:99. 1836.

Panstreps Raf. loc. cit. 4:41. 1836.

Corynanthes Schlecht. in Bot. Zeit. 6:65. 1848.

Corythantes Lem. in d'Orbigny, Dict. Hist. Nat. 4:259. 1849.

Erect epiphytic herbs. Pseudobulbs slender, subcylindric, tapering, conspicuously ridged, the apex with 2 or rarely 3 lanceolate or elliptic-lanceolate, plicate, strongly veined, subcoriaceous, acute or acuminate leaves. Inflorescences elongate, slender, pendent racemes from the base of the pseudobulbs. Flowers large, fragrant, often brightly colored, usually 2-3, rarely as many as 7, of very complex structure, on slender arching pedicels. The genus has been divided by Schlechter into two sections EUCORYANTHES and LAMELLUNGUIS. In both sections the sepals broad, membranaceous, free, spreading or strongly reflexed, the margins undulate or recurved, the laterals obliquely subfalcate and much larger than the dorsal sepal; the petals inconspicuous, linear-lanceolate, often subfalcately recurved at the apex, with undulate margins. Lip very fleshy, usually complexly 4-parted, the narrow basal claw continuous with the base of the column; the hypochile spreading and concave, or galeate, glabrous or pubescent; the mesochile more or less elongate and canaliculate. In EUCORYANTHES transverse lamellae or excrescences entirely lacking; in LAMELLUNGUIS, these conspicuously present. In both sections epichile inflated, very large and galeate or cup-shaped, in nature usually containing a considerable quantity of clear liquid. Column elongate, terete below, without a foot, the base with 2 short, fleshy, often subfalcate horns or glands from which the liquid is excreted, the apex inflexed-clavate and usually shortly 2-alate on either side of the clinandrium. Anther terminal, operculate, incumbent, 2-celled; pollinia 2, waxy.

About 20 species of American epiphytic plants ranging from Guatemala to Peru and Brazil. They usually occur as a conspicuous element in the unique arboreal myrmecophyllous gardens, in the nests of ants of the genera *Camponotus* and *Azteca*, the association often including a purple- or orange-flowered, erect, tufted *Epidendrum* and several apparently specialized succulent-leaved non-orchidaceous plants, among the most frequent being *Peperomias* and members of the Gesneriaceae. The flowers are probably the most complex and fascinating of the entire Orchidaceae, every detail of the floral structure having been profoundly modified to attract insects and to assure cross-fertilization.

To accomplish insect attraction, the flowers, although lasting only 3-4 days, are usually brightly colored, large, and strongly fragrant, secreting some substance on the inner margins of the epichile which is extremely attractive to hymenopterous insects. The sepals, although large, soon wither, the direction of the insect's

path being left almost entirely to the intricate contrivances of the marvelous labellum. This organ is unique in the *Orchidaceae*, the apical lobe or epichile resembling an inverted helmet or waxy cup, on one side prolonged below the apex of the column into a short, usually 3-cornute spout-like channel. The column, in its turn, is sharply reflexed at the apex, which rests precisely over the channel, exposing the anther and stigmatic surface to any insect seeking a way out from the interior of the lip.

It would seem that the broad expanse of the mouth of the epichile would provide ample space for an insect to take flight, with only an occasional individual choosing the lateral exit. If the flowers were of longer duration, this might have been left to pure chance, but since time is also an important factor, this possibility of escape by flight has been ingeniously circumvented by the plant in the following manner. Above the cup, on the base of the column, 2 fleshy glands have been developed. When the flowers are fully open and numbers of bees have been attracted to gnaw at the inner margins of the cup, these glands begin secreting a clear liquid, drop by drop, filling the bottom of the cup to the level of the apical channel. Any bee that loses its footing in the competing swarm on the upper margins is precipitated into this liquid, and once its wings have been wet, it has no other choice than to force its way out through the narrow channel below the stigma and anther. Thus the first bee to make the circuit receives the pollinia firmly cemented to its back, to be inserted on the stigma of this or another flower, on the next turn through. A single species of this most remarkable of all orchid genera has thus far been found in Panama.

1. *CORYANTHES MACULATA* Hook. in Bot. Mag. t. 3102. 1831.

Coryanthes maculata Lindl. in Bot. Reg. 21: t. 1793. 1835.

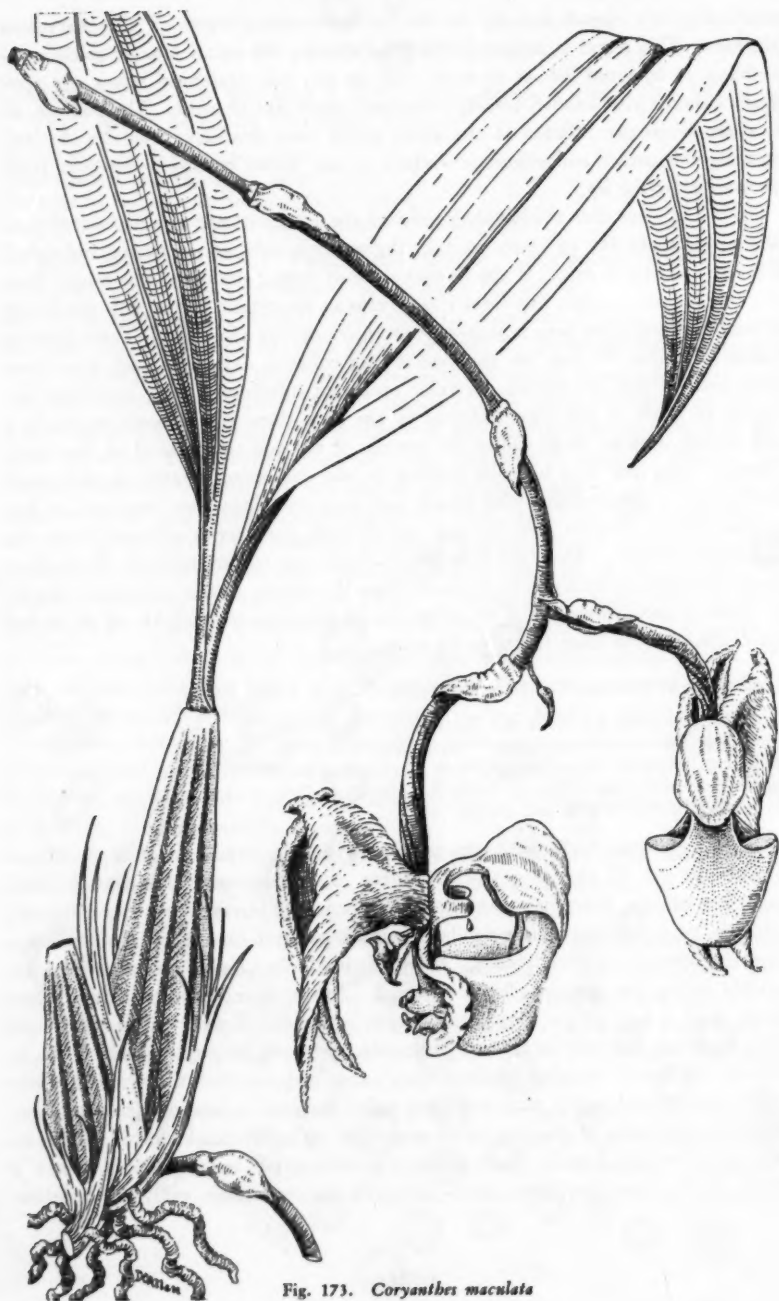
Coryanthes Albertinae Karst. Ausw. Neuer Gew. Venez. 5: t. 1. 1848.

Coryanthes splendens Barb. Rodr. Gen. & Sp. Orch. Nov. 1: 103. 1877.

Coryanthes Hunteriana Schltr. in Fedde Rep. Sp. Nov. Beih. 17: 63. 1922.

Coryanthes Powellii Schltr. loc. cit. 64. 1922.

Erect epiphytic herbs with elongate, subcylindric, tapering, strongly ridged pseudobulbs 6.5–15 cm. long and 2.5–4 cm. wide, bearing at the apex 2 firm, lanceolate, plicate, strongly veined, acute or acuminate leaves 30–60 cm. long and 4–10 cm. wide. Inflorescences slender, elongate, pendent racemes 30–50 cm. long, from the base of the pseudobulbs. Flowers usually 2–3, large and attractive, of variable color, the lip complexly 4-parted. Sepals membranaceous, free, clear yellow with a few purple spots, pale purple, or reddish-brown, dorsal sepal sub-orbicular-ovate, broadly acute and minutely apiculate, the apical half strongly reflexed, the lateral margins revolute, 2–2.5 cm. long and 3–3.5 cm. broad when spread out, lateral sepals very strongly reflexed, from a broadly lobulate base, obliquely subfalcate, or the pair when spread out obliquely dolabriform, 5–6.5 cm. long and 2.5–4 cm. broad. Petals membranaceous, usually colored similarly to the sepals, ligular-lanceolate, the apices obliquely subacute, the margins undulate,

Fig. 173. *Coryanthes maculata*

(404)

3–3.5 cm. long and .6–1.0 cm. wide. Lip very fleshy, complexly 4-parted, clear waxy yellow, pale purplish spotted with blood red, or the hypochile yellow, the mesochile and epichile reddish brown on the outer surfaces, the inner epichile white spotted red-brown. Claw of the lip semiterete, continuous with the base of the column; hypochile broadly galeate, glabrous, the apex obtuse or subacute, in profile 2–2.5 cm. long and 2–2.5 cm. broad; mesochile canaliculate, glabrous, the basal half covered by the hypochile, in profile 2.5–3 cm. long and .8–1.5 cm. wide; epichile deeply cucullate or galeate, broadly obtuse, seen in profile 3–3.5 cm. long and 2.5–3.5 cm. broad, in fresh material resembling a waxy cup or bucket, prolonged below the apex of the column into a 3-cornute spout or channel. Column subterete, without a foot, near the base with 2 broad, lateral, subfalcate or obliquely auriculate glands, 8–10 mm. long and 5–10 mm. wide, the apex strongly reflexed and shortly 2-alate on either side of the clinandrium.

Panama, Venezuela, the Guianas, Brazil, and probably other adjacent territory.

CANAL ZONE: Río Indio, near Gatún, sea level, *Butcher s. n.*, *Allen 2054*. PANAMÁ: hills east of Panama City, sea level, *Powell 19, 156, 305*.

In Panama the plants are frequently found in the tops of slender trees, in ants' nests, often associated with *Epidendrum imatophyllum*. They are well protected by the belligerent ants and are painful subjects to collect, and still more painful to transport. Moreover, they seldom thrive in cultivation, possibly from lack of some essential element contributed by the ants in their natural association. It seems possible that this may be only a well-marked variety of *Coryanthes speciosa*.

58. XYLOBIUM Lindl.

XYLOBIUM Lindl. in Bot. Reg. 11: sub t. 897. 1825; Benth. & Hook. Gen. Pl. 3:547. 1883.

Onkeripus Raf. Fl. Tellur. 4:42. 1836.

Pentulops Raf. loc. cit. 1836.

Epiphytic herbs with short or elongate, ovoid or semiterete pseudobulbs, the bases enveloped in 2–4 papery, brown, imbricating bracts, the apices with 1–2 lanceolate, plicate, subcoriaceous, strongly veined, acute or acuminate leaves. Inflorescences short or elongate, erect or arching racemes from the base of the pseudobulbs. Flowers few to many, on short pedicels, reminiscent of those of a small-flowered *Maxillaria*. Sepals subequal, membranaceous, spreading, the dorsal sepal free, the laterals broader, adnate to the foot of the column, forming a short mentum, the dorsal surface, particularly near the apex, usually with an erect central keel. Petals membranaceous, subequal to the dorsal sepal. Lip entire or 3-lobed, the lateral lobes or margins erect, the base articulated with the foot of the column; disk smooth, callused or with parallel prominent nerves or lamellae. Column short, erect, somewhat arcuate, semiterete, the apex subclavate or narrowly winged, the base produced into a foot. Anther terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 2 or 4, waxy.

About 20 species of American epiphytes, found from southern Mexico to Peru and Brazil, and in the West Indies. The flowers considerably resemble those of some species of *Maxillaria*. However, the genus is amply separated by the racemose flowering habit and the plicate rather than coriaceous leaves. Three species are known from Panama.

- a. Lip conspicuously 3-lobed.
 - b. Lip densely papillose. Pseudobulbs elongate, semi-terete, diphyllous.... 1. *X. ELONGATUM*
 - bb. Lip not papillose. Pseudobulbs ovoid, stout, di- or triphyllous..... 2. *X. FOVEATUM*
- aa. Lip entire or obscurely 3-lobed. Pseudobulbs short, subcylindric, monophyllous or very rarely diphyllous 3. *X. POWELLII*

1. *XYLOBIUM ELONGATUM* (Lindl.) Hemsl. Biol. Centr.-Amer. Bot. 3:252. 1885.

Maxillaria elongata Lindl. & Paxt. in Paxton's Flow. Gard. 3:69, fig. 264. 1852-53.

Epiphytic herbs with erect, elongate, semiterete pseudobulbs 10-27 cm. long and .4-1.2 cm. wide, the bases enveloped in 3-4 brown, papery, imbricating bracts, the apices with 2 lanceolate or elliptic-lanceolate, plicate, strongly veined, acute or acuminate leaves 15-36 cm. long and 2.5-9 cm. wide. Inflorescences erect, slender racemes 10-15 cm. long, produced from the base of the pseudobulbs, the lower portion below the flowers enveloped in several broad, papery, closely imbricating bracts. Flowers few to many, comparatively large, on short pedicels. Sepals membranaceous, white or pale yellow, spreading, subequal, the dorsal sepal free, lanceolate, acute or acuminate, 15-25 mm. long and 4-7 mm. broad, lateral sepals adnate at the base to the column foot, forming a short mentum, somewhat obliquely lanceolate, acuminate, with a strong central keel on the dorsal surface, 15-30 mm. long and 4-8 mm. wide. Petals membranaceous, white or pale yellow, spreading, subequal to the dorsal sepal, lanceolate, acuminate, 15-20 mm. long and 4-7 mm. wide. Lip 3-lobed, articulated at the base with the foot of the column, 14-18 mm. long and 4-8 mm. broad, white or pale yellow, with purple or maroon stripes, lateral lobes conspicuous, erect, about equaling the column, apical lobe densely papillose, the lateral margins strongly inflexed; disk with 5 thickened central nerves or lamellae. Column short, stout, terete, produced at the base into a long broad foot. Anther terminal, operculate, incumbent, 1-celled; pollinia 4, waxy.

Costa Rica and Panama.

COCLÉ: hills north of El Valle de Antón, 1000 m., *Allen* 2705, 2745, 3739. CHIRIQUÍ: near Boquete, 3800-4000 ft., *Powell* 167; Bajo Mono-Robalo trail, western slopes of Cerro Horqueta, 5000-7000 ft., *Allen* 4787.

A frequent plant of the highland forests above about 2500 ft., readily distinguished from the other local species by the extremely elongate, slender, diphyllous pseudobulbs, and the densely papillose lip. Usually to be found in damp situations in heavy shade, often on the lower trunks of large trees. The flowering season is during the fall and winter months, from September to March.

2. *XYLOBIUM FOVEATUM* (Lindl.) Nicholson, Dict. Gard. 4:225. 1887.*Maxillaria foveata* Lindl. in Bot. Reg. n. s. 2: Misc. 2. 1839.*Maxillaria concava* Lindl. loc. cit. 7: Misc. 4. 1844.*Maxillaria stachybiorum* Rehb. f. in Bot. Zeit. 10:735. 1852.*Xylobium concavum* Hemsley, Biol. Centr.-Amer. Bot. 3:252. 1883.*Xylobium stachybiorum* Hemsley, loc. cit. 1883.*Xylobium Filomenoi* Schltr. in Fedde Rep. Sp. Nov. Beih. 9:100. 1921.

Epiphytic herbs. Pseudobulbs stout, ovoid or subconic, tapering, smooth or somewhat ridged, 4–9 cm. long and 1.5–4 cm. wide, the base enveloped in 2–3 brown, fibrous, imbricating bracts, the apex with 2–3, plicate, lanceolate, strongly veined, acute or acuminate, subcoriaceous leaves 24–40 cm. long and 2.5–7 cm. wide, the blades usually deciduous after the second year, the apex of the old pseudobulbs unarmed. Inflorescences erect racemes 12–30 cm. tall, from the base of the pseudobulbs, the lower rachis below the flowers enveloped in several broad, papery bracts. Flowers usually many, fragrant, on short pedicels. Sepals membranaceous, subequal, spreading, creamy white, the dorsal sepal free, lanceolate-acuminate, 10–14 mm. long and 3–4 mm. wide, laterals adnate to the foot of the column, forming a mentum, subfalcately lanceolate-acuminate, 12–14 mm. long and 3–4 mm. wide, the dorsal surface with a prominent central keel. Petals subequal to the dorsal sepal, membranaceous, creamy white, lanceolate-acuminate, 8–10 mm. long and 2–3 mm. wide. Lip creamy white with reddish veining on the disk, conspicuously 3-lobed, 10–12 mm. long, articulated at the base with the foot of the column, the lateral lobes rounded, erect, about equaling or somewhat exceeding the column, apical lobe obtuse, spreading; disk with 5 thickened nerves or keels. Column very short, semiterete, the apex obtuse; the base produced into a long broad foot. Anther 1-celled; pollinia 4.

Mexico to Peru and British Guiana; Jamaica.

CANAL ZONE: Barro Colorado Island, *Aviles* 32. PANAMÁ: Ceiba Tierra, sea level, *Powell* 3069; Ana Lago, sea level, *Powell* 3064; hills east of Panama City, sea level, *Powell* 27; Chiva-Chiva, sea level, *Powell* 3053; vic. Pacora, sea level, *Powell* 3026, *Allen* 821; forest along telephone cable, vic. Río Indio Hydrographic Station, Upper Madden region, *Steyermark & Allen* 17466; San José Island, Perlas Archipelago, *Johnston* 1017, 1117.

A very frequent species found throughout the lowlands of our area, flowering during the fall and winter months from November to March.

3. *XYLOBIUM POWELLII* Schltr. in Fedde, Rep. Sp. Nov. Beih. 17:66. 1922.*Xylobium sublobatum* Schltr. loc. cit. 19:51. 1923.

Erect epiphytic herbs with slender subterete (rarely cylindric-tapering) pseudobulbs 4–7 cm. long and .7–1.8 cm. wide, enveloped at the base in 2–3 fibrous, imbricating bracts, the apex with 1 (rarely 2) lanceolate, plicate, strongly veined, long-petioled, acute or shortly acuminate leaves 20–60 cm. long and 2–5.5 cm. wide. Inflorescences erect racemes, 9–15 cm. tall, the bases below the flower-

ing portion enveloped in several papery, imbricating bracts. Flowers few to many, on short pedicels, yellow or tan, sometimes tinged with light green. Sepals membranaceous, subequal, spreading, the dorsal sepal elliptic-lanceolate, acute, 10–12 mm. long and 4–6 mm. wide, laterals adnate to the foot of the column, forming a mentum, from an oblique base, lanceolate, acute, 12–14 mm. long and 4–6 mm. wide, the dorsal surface with a prominent central keel. Petals subequal to the dorsal sepal, linear-lanceolate, acute, 10–12 mm. long and 3–4 mm. broad. Lip entire or obscurely 3-lobed, articulated at the base with the column foot, 10–12 mm. long; the narrow lateral lobes, if present, or the margins erect; the apical lobe somewhat concave, subacute; disk with 3 prominent erect nerves or keels. Column very short, subterete, produced at the base into a foot. Anther 1-celled; pollinia 4. Costa Rica and Panama.

CHIRIQUI: without definite locality, 4000 ft., *Powell* 117; valley of the upper Río Chiriquí Viejo, vic. of Monte Lirio, 1300–1900 m., *Seibert* 135, 223; Finca Lérída to Peña Blanca, 1750–2000 m., *Woodson & Schery* 325; Quebrada Velo, 1800 m., *Woodson & Schery* 281; vic. Bajo Mono and Quebrada Chiquero, 1500 m., *Woodson & Schery* 534; Bajo Chorro, 6000 ft., *Davidson* 241.

A very frequent species of the Chiriquí highlands, flowering in July and August. Although the type specimen of *Xylobium Powellii* was described as having two leaves, nearly all plants seen had a single leaf. Type material has not been available for comparison, but our species seems to agree very well with an earlier monophyllous species from Guatemala, *Xylobium Tuerckheimii* Kränzl., and it seems likely that subsequent investigation may prove them to be identical.

59. BIFRENARIA Lindl.

BIFRENARIA Lindl. Gen. & Spec. Orch. Pl. 152. 1833; Benth. & Hook. Gen. Pl. 3:546. 1883.

Adipec Raf. Fl. Tellur. 2:101. 1836.

Stenocoryne Lindl. in Bot. Reg. n. s. 6: Misc. 53. 1843.

Lindleyella Schltr. Die Orchideen, p. 414. 1914.

Epiphytic herbs. Pseudobulbs short, fleshy, ovoid, subconic or subpyramidal, often abruptly 4-angulate or laterally compressed, the bases enveloped in 2–3 fibrous, imbricating bracts, the apex with 1–2 lanceolate or elliptic-lanceolate, plicate, strongly veined, acute or acuminate leaves. There are two quite distinctive groups of species, one of which has been segregated by Schlechter as a separate genus under the name *Lindleyella*. Schweinfurth (Bot. Mus. Leaf. Harv. Univ. 11:246. 1944) has pointed out that the floral characters proposed by Schlechter for such separation are equally applicable to species of the other group, so that it is impossible to accept *Lindleyella* as a valid generic concept. However, since the groups are sufficiently distinctive to be separated on gross characters alone, the name proposed by Schlechter is retained as a section, simply for purposes of convenience. On this basis, those species superficially resembling *Bifrenaria atropurpurea*, the generic type with 1–3 large flowers on short erect racemes, are considered

as representing the section EUBIFRENARIA, while those resembling *Bifrenaria picta* and *B. aurantiaca*, with many small flowers on elongate arching racemes, are considered as representing the section LINDLEYELLA. In both sections of the genus, the sepals are free, subequal, spreading, the laterals adnate to the column foot, forming a short or elongate spur-like mentum. Petals subequal to the dorsal sepal or smaller. Lip 3-lobed, articulated at the base with the foot of the column, lateral lobes erect, the mid-lobe spreading, entire or bifid; disk fleshy, lamellate, denticulate or hirsute. Column erect, thickened, semiterete, wingless, produced at the base into an elongate foot. Anther terminal, operculate, incumbent, strongly convex, sometimes cristate on the dorsal surface, 1-celled or imperfectly 2-celled; pollinia 2 or 4, waxy.

A variable genus of mostly Brazilian epiphytes a few species ranging to Peru, the Guianas, Trinidad, Venezuela, and Colombia, with a single species of the section LINDLEYELLA known from eastern Panama.

1. BIFRENARIA PICTA (Schltr.) C. Schweinf. in Bot. Mus. Leaf. Harv. Univ. 11:246. 1944.

Lindleyella picta Schltr. in Fedde Rep. Sp. Nov. Beih. 27:173. 1924.

Epiphytic herbs. Pseudobulbs ovoid, laterally compressed, somewhat ridged, 2.5–5 cm. long and 2–2.5 cm. wide, enveloped at the base in 2–3 fibrous imbricating bracts, the apex with a single, long-petiolate, elliptic-lanceolate, plicate, strongly veined, shortly acuminate leaf 38–46 cm. long and 5–6.8 cm. wide. Inflorescences elongate, slender, arching racemes produced from the base of the pseudobulbs. Flowers many, relatively small, on short pedicels, typical of the section LINDLEYELLA. Sepals subequal, spreading, membranaceous, deep red, or red marked with yellow particularly at the base, dorsal sepal free, elliptic-lanceolate, acute, 10–14 mm. long and 3–5 mm. wide, lateral sepals somewhat oblique, elliptic-lanceolate, acute, adnate to the foot of the column, 10–14 mm. long and 4–8 mm. wide. Petals subequal to the dorsal sepal, yellow, spotted red, elliptic-lanceolate, acute, 10–12 mm. long and 4–5 mm. wide. Lip 3-lobed, 10–12 mm. long, red marked with yellow, the base shortly clawed, lateral lobes erect, subfalcate, obliquely obtuse, longer than broad, the anterior margin undulate and crisped; disk between the lateral lobes with a convex, rather obscurely verrucose callus; mid-lobe subreniform or subquadrate, broadly spreading, contracted at the base into an isthmus with a short, suberect, fleshy, obtuse, linguiform callus, the apex obscurely bilobulate, shallowly emarginate, the lateral lobules undulate and crisped. Column semiterete, somewhat arcuate, 6–8 mm. long, produced at the base into a foot. Anther imperfectly 2-celled; pollinia 2, subglobose.

Panama and Colombia.

DARIÉN: Chepigana District, Cana-Cuasi trail, 800 ft., Terry & Terry 1616.

The only record for the genus in North America.

60. LYCASTE Lindl.

LYCASTE Lindl. in Bot. Reg. Misc. n. s. 6: Misc. 14. 1843; Benth. & Hook. Gen. Pl. 3:547. 1883.

Deppia Raf. Fl. Tellur. 2:51. 1836.

Erect, epiphytic or sometimes pseudo-terrestrial herbs. Pseudobulbs short, fleshy, ovoid or ellipsoid, tapering, often laterally compressed, smooth or plurisulcate, the bases enveloped in several closely imbricating, papery or coarsely fibrous bracts, the upper 1 or 2 of which are usually foliaceous; the apex with 1 to several, usually broad, plicate leaves which are ultimately deciduous, the apex of the old pseudobulbs with or without 2 sharp marginal spines; roots fibrous, often pubescent or conspicuously lanuginose. Inflorescences 1 to many erect, stout or filiform, single-flowered scapes from the base of the pseudobulbs, enveloped in several closely imbricating or distant, tubular or spathaceous, papery bracts. Flowers small to large, usually more or less nodding. Sepals subequal, membranaceous, spreading, the laterals somewhat broader than the dorsal sepal, sometimes somewhat reflexed, adnate at the base to the foot of the column, forming a short mentum. Petals subequal to the dorsal sepal or shorter. Lip conspicuously or obscurely 3-lobed, the base continuous with, or articulated with, the foot of the column, lateral lobes or margins erect, mid-lobe spreading or reflexed; disk with a thickened callus. Column slender, semiterete, rather arcuate, produced at the base into a foot. Anther terminal, operculate, incumbent, 1-celled; pollinia 4, waxy.

A rather perplexing genus of perhaps 25 species of American epiphytes, ranging from southern Mexico to Peru, Brazil, and the West Indies. Although many of the species have been put at one time or another into the allied genus *Maxillaria*, they are readily separable by the plicate, rather than conduplicate leaves. Five species are known to occur in Panama.

- a. Apex of the old pseudobulbs armed with 2 conspicuous sharp spines.
Flowers produced after the leaves have fallen, or concurrently with the flush of new growth. Pseudobulbs at flowering time without mature foliage.
- b. Lip when spread out about as long as broad; apical lobe without a basal constriction.
- c. Lip more than 1.5 cm. long..... 1. *L. BREVISPATHA*
- cc. Lip less than 1.5 cm. long..... 2. *L. CAMPBELLII*
- bb. Lip when spread out about twice as long as broad; apical lobe with a basal constriction 3. *L. TRICOLOR*
- aa. Apex of the old pseudobulbs not armed with 2 conspicuous sharp spines.
Flowers produced at the end of the current season's growth, after the pseudobulbs have matured, but before the leaves have fallen.
- b. Lip conspicuously 3-lobed, more than twice as long as broad when spread out; apical lobe ovate or subquadrate..... 3. *L. MACROPHYLLA*
- bb. Lip obscurely 3-lobed, less than twice as long as broad when spread out; apical lobe broadly obtuse, separated from the laterals by plicate folds..... 4. *L. POWELLII*

1. *LYCASTE BREVISPATHA* Kl. ex Lindl. in Paxton's Flow. Gard. 3:44. 1852-53.

Lycaste candida Lindl. ex Rchb. f. in Walp. Ann. 6:604. 1863.

Epiphytic (rarely pseudo-terrestrial) herbs. Pseudobulbs fleshy, usually elliptic-ovoid, rarely suborbicular, laterally compressed, 4.5-6.5 cm. long and 2-3.5 cm. wide, enveloped at the base in several coarsely fibrous bracts, the apex with 2-4 elliptic-lanceolate, plicate, acute or shortly acuminate leaves which are ultimately deciduous, 15-20 cm. long and 3-5 cm. wide, the apex of the old pseudobulbs armed with 2 conspicuous sharp spines; roots usually conspicuously lanuginose. Inflorescences 1 to many slender, erect scapes 5-7 cm. tall, usually produced concurrently with the flush of new growth from the base of the old leafless pseudobulb, the filiform rachis provided with several distant tubular sheathing bracts, the apical bract usually about half the length of the ovary. Flowers more or less pseudo-campanulate, solitary, somewhat nodding. Sepals subequal, membranaceous, usually pale green to olive-green, rarely rose, the dorsal sepal free, erect, elliptic-lanceolate, acute, the apex strongly recurved, 2.5-2.8 cm. long and 10-15 mm. wide, laterals adnate to the foot of the column, forming a short mentum, from the oblique base elliptic-lanceolate, acute, the apices strongly recurved, 2.5-3 cm. long and 1.0-1.5 cm. wide. Petals subequal to the sepals, white marked rose, or rarely pure white, elliptic-oblongate, acute, the apices recurved, 2.4-2.6 cm. long and 1.0-1.5 cm. wide. Lip 3-lobed, articulated at the base with the foot of the column, white with rose markings, or rarely white, nearly as broad as long when spread out, 2.2-2.5 cm. long and 1.8-2.2 cm. wide, lateral lobes erect, rather obscurely emarginate at the subacute apices, mid-lobe broadly obtuse, the apex somewhat reflexed; disk with an elongate, acute, 2-costate linguiform callus. Column semiterete, rather arcuate, 8-9 mm. long, the under-surface conspicuously pubescent, the base produced into a foot.

Costa Rica and Panama.

CHIRIQUÍ: without definite locality, shady places, 4000-4500 ft., *Powell 140*; vic. Finca Lérica, upper forested margins of the Quebrada Velo, 5000 ft., *Allen 4749*.

A fairly frequent species of the Chiriquí highlands, usually being found in shaded places between 4000 and 5000 ft. elevation. The flowers are variable in color, usually being produced from February to about April.

2. *LYCASTE CAMPBELLII* C. Schweinf. in Johnston, *Sargentia* 8:103, fig. 1949. ined.

Epiphytic herbs with ovoid-ellipsoid, somewhat laterally compressed pseudobulbs 3.5-5 cm. long and 1.5-2.5 cm. wide, enveloped at the base in several coarsely fibrous, imbricating sheaths; apex of the pseudobulbs (during the growing season) with 1-3 plicate, elliptic-lanceolate leaves which are ultimately deciduous, the old pseudobulbs armed at the apex with 2 sharp spines; roots fibrous, lanuginose. Inflorescences 1 to several erect, filiform scapes less than 8 cm. tall, produced from the base of the current pseudobulb after the leaves have fallen. Flowers pseudo-campanulate, more or less nodding, the smallest of the genus in Panama. Sepals

subequal, membranaceous, green, the dorsal sepal ovate-elliptic, acute, about 1.8 cm. long and 1 cm. wide when spread out, laterals adnate to the foot of the column, forming a short conical mentum, from the oblique base oblong-ovate, acute, 1.8 cm. long and about 1 cm. wide. Petals elliptic-ovate, obtuse, abruptly apiculate, yellowish green, about 1.5 cm. long and 1 cm. wide. Lip 3-lobed, contracted at the base and articulated with the foot of the column, yellow, about 1.6 cm. long and .9–1.0 cm. wide when spread out, lateral lobes erect and somewhat incurved, the apices rather obliquely acute, mid-lobe ovate, subacute, with a recurved apicule; disk between the lateral lobes with a concave oblong-obtuse callus. Column short, stout, semiterete, somewhat arcuate, about 6–8 mm. long; obscurely puberulent on the under-surface, produced at the base into a foot.

Panama.

PANAMÁ: San José Island, Perlas Archipelago, high on trees in stream-side forest in area 11-B, Johnston 1371, Campbell 12.

Known only from the type collection. Although vegetatively reminiscent of *Lycaste candida* or *L. tricolor*, it may readily be distinguished by the much smaller, differently colored flowers. The season of flowering is given by Dr. Johnston as February.

3. *LYCASTE MACROPHYLLA* Lindl. in Bot. Reg. n. s. 6: Misc. 14. 1843.

Maxillaria macrophylla Poepp. & Endl. Nov. Gen. & Sp. 1:37, t. 64. 1836.

Lycaste plana Lindl. in Bot. Reg. n. s. 5: Misc. 85. 1842.

Lycaste Dowiana Endres & Rehb. f. in Gard. Chron. n. s. 2:194. 1874.

Lycaste Filomenoi Schltr. in Fedde, Rep. Sp. Nov. Beil. 9:100. 1921.

Epiphytic herbs with stout, ovoid, somewhat laterally compressed, often rather angulate or plurisulcate pseudobulbs 4–10 cm. long and 3–6 cm. wide, the bases enveloped in 3–4 closely imbricating, papery bracts, the upper 2 of which are foliaceous, the largest blade about 40 cm. long and 10–12 cm. broad; the apex of the pseudobulbs with 2–3 broad, plicate, oblanceolate, acute or acuminate leaves 40–75 cm. long and 10–12 cm. broad, which are ultimately deciduous; the apices of the old pseudobulbs not armed with sharp spines. Inflorescences few to many erect, single-flowered scapes 8–18 cm. tall, from the base of the mature pseudobulbs, the rachis enveloped in several broad, papery, spathaceous bracts, the uppermost of which is usually broadly cucullate, acute, about equaling or somewhat exceeding the ovary. Flowers large and conspicuous, fragrant, more or less nodding. Sepals subequal, broadly spreading, olive-green, sometimes shaded on the margins with reddish-brown, the dorsal sepal free, erect, lanceolate to elliptic-lanceolate, acute, 4.5–6 cm. long and 1.5–2.5 cm. wide, laterals adnate to the foot of the column, forming a short mentum, from the oblique base lanceolate to elliptic-lanceolate, acute, 4.5–6 cm. long and 2–3 cm. wide. Petals subequal to the sepals, not spreading, more or less parallel with the column, white, often spotted rose-pink, linear-lanceolate to elliptic-oblanceolate, acute, the apices recurved, 4–5 cm. long and 1.8–2.2 cm. broad. Lip 3-lobed, 3–4.5 cm. long and 1.4–1.6 cm. wide when spread out, usually not equaling the petals, narrowed at the base and

articulated with the foot of the column, white, usually with the margins of the apex spotted or blotched rose-red, lateral lobes erect, the apices rather irregularly oblique, mid-lobe spreading, ovate to subquadrate, acute or obtuse, the margins slightly ciliate and incurved; disk with a fleshy, lanceolate, acute, concave callus. Column slender, semiterete, somewhat arcuate, white, 18–23 mm. long.

Costa Rica, Panama, Colombia, Venezuela, Peru, and Bolivia.

COCLÉ: region north of El Valle de Antón, 3000 ft., *Allen 2665, 5067, 5139*; western slope and summit of Cerro Valle Chiquito, 700–800 m., *Seibert 644*. VERAGUAS: forested slopes of Cerro Tuté, west of Santa Fé, 2500–3000 ft., *Allen & Fairchild 4400*. CHIRIQUÍ: without definite locality, 5000 ft., *Powell 246*.

A frequent, rather variable species of the wet highland forests of Coclé, Veraguas, and Chiriquí provinces. The Coclé specimens are rather consistently smaller than those from Veraguas and Chiriquí, particularly in the vegetative parts, but otherwise appear to be very nearly identical. The Coclé form is usually considered as representing *Lycaste Dowiana*, but the supposed differences (shorter floral bract and narrower lip) have been found on careful examination to be inconstant characters, scarcely any two specimens being exactly alike, and, in any event, hardly differences warranting specific segregation. From the evidence now available, the Coclé plants appear to be at most a local form of the widespread and variable *Lycaste macrophylla*. The flowering season is from March to about July.

4. *LYCASTE POWELLII* Schltr. in Fedde Rep. Sp. Nov. Beih. 17:65. 1922.

Epiphytic, or often pseudo-terrestrial herbs with elliptic-ovoid, laterally compressed, smooth, or somewhat ridged pseudobulbs 3–6 cm. long and 2–3 cm. wide, the bases enveloped in 3–4 papery, closely imbricating bracts the upper 2 of which are usually foliaceous; the apices of the pseudobulbs with 2–3 plicate, lanceolate or elliptic-lanceolate, acute or acuminate, ultimately deciduous leaves 20–35 cm. long and 4–7 cm. broad; the apices of the old pseudobulbs unarmed. Inflorescences 1 to about 4, slender, erect, 1-flowered scapes 5–14 cm. tall, produced from the bases of the mature pseudobulbs before the leaves have fallen, the rachis provided with several distant, papery, tubular, acuminate bracts the uppermost of which is spathaceous and conspicuously exceeds the ovary. Flowers relatively large, very fragrant. Sepals widely spreading, pale translucent green, heavily blotched with chestnut-brown, or wine-red with yellow margins, dorsal sepal free, linear-lanceolate, acute, 3–4 cm. long and .8–1.4 cm. wide, the apex lightly recurved, laterals adnate to the foot of the column, forming a short mentum, from the oblique base, linear-lanceolate, acute, 3–4.2 cm. long and .6–1.4 cm. wide. Petals subequal to the sepals, cream-yellow to nearly white, spotted rose-pink or wine-red, elliptic-lanceolate, obtuse or subacute, 2.5–3.5 cm. long and 1.2–1.8 cm. wide, more or less parallel with the column, the apices strongly reflexed. Lip elliptic-obovate, obtuse or subacute when spread out, 2.6–2.8 cm. long and 1.4–1.7 cm. wide, obscurely 3-lobed, the lateral lobes or margins erect, the mid-lobe short, spreading, obtuse or subacute, separated from the laterals by plicate folds; disk with a short,

fleshy, ligular, obtuse, concave callus. Column semiterete, 1.8–2 cm. long, slightly arcuate, minutely papillose.

Panama.

PANAMÁ: hills east of Panama City, *Powell 15*; Cerro Campana, 2500 ft., *Fairchild s. n.* COCLÉ: vic. El Valle de Antón, floor and forested ravines in dry hills to the south, 600–800 m., *Allen 761, 2666*; floor of El Valle de Antón, 600 m., *Fairchild s. n.*

A frequent and attractive species of the wooded ravines of the intermediate highlands of Cerro Campana and El Valle de Antón, where they are often found growing on rocks or on low, gnarled trees of the genus *Coccoloba*. The flowering season is usually from July to September.



Fig. 174. *Lycaste tricolor*

(414)

5. *LYCASTE TRICOLOR* (Kl.) Rchb. f. in Walp. Ann. 6:603. 1863.*Maxillaria tricolor* Kl. in Allgem. Gartenzeit. 20:186. 1852.*Lycaste Bradeorum* Schltr. in Fedde Rep. Sp. Nov. Beih. 19:138. 1923.

Epiphytic herbs with elliptic-ovoid, tapering, laterally compressed, smooth or ridged pseudobulbs 6-9 cm. tall and 2.5-3 cm. wide, the bases enveloped in several coarsely fibrous bracts, the apex (during the growing season) with 3-4 elliptic-lanceolate, plicate, acute or acuminate, deciduous leaves; the apex of the old pseudobulbs armed with 2 short, sharp spines; roots fibrous, lanuginose. Inflorescences 1 to several erect, single-flowered scapes 9-12 cm. tall, from the base of the pseudobulbs, produced after the leaves have fallen or concurrently with the flush of new growth. Flowers pseudo-campanulate, relatively large. Sepals spreading, subequal, the apices strongly recurved, pale green, often spotted with pink, the dorsal sepal free, elliptic-lanceolate, acute, often minutely apiculate, 2.8-3.2 cm. long and 1.2-1.5 cm. wide, lateral sepals adnate at the base to the foot of the column, forming a short mentum, from the oblique base lanceolate, acute, often minutely apiculate, 2.8-3.2 cm. long and 1.0-1.4 cm. wide. Petals subequal to the sepals, spreading, the apices strongly recurved, white, often spotted pink, elliptic-oblancheolate, acute, 2.4-2.6 cm. long and 1.4-1.6 cm. wide. Lip conspicuously 3-lobed, about twice as long as broad when spread out, narrowed at the base and articulated with the foot of the column, white, usually spotted pink, 2.8-3 cm. long and 1.4-1.6 cm. wide when spread out, lateral lobes erect, the anterior margins obscurely emarginate at the obliquely acute apices, mid-lobe subquadrate or ovate, obtuse, with a basal constriction, the apex strongly reflexed; disk with an elongate, acute, concave callus. Column semiterete, somewhat arcuate, 12-14 mm. long, produced at the base into a foot.

Guatemala, Costa Rica, and Panama, and probably adjacent territory.

COCLÉ: Río Mata Ahogado, 1200 ft., *Fairchild s. n.*; Río Mata Ahogado, volcanic badlands southeast of El Valle de Antón, 1500 ft., *Allen 4526*. VERAGUAS: Río Santa María, vic. Santa Fé, 1000 ft., *Allen 4567*.

A frequent and attractive species often found on low-spreading trees overhanging streams in the volcanic badlands of Coclé and Veraguas provinces, usually at about 1000-1500 ft. elevation. It seems possible that subsequent investigation may prove this to be simply a well-marked variety of *Lycaste brevispatha*. The flowering season is in May and June.

60-A. *KOELLENSTEINIA* Rchb. f.

KOELLENSTEINIA Rchb. f. in Bonplandia 2:17. 1854; Walp. Ann. 6:551. 1863; Schltr. in Orchis 12:24. 1918.

Terrestrial or epiphytic herbs, with or without minute subterete or 4-angulate pseudobulbs. Pseudobulbs when present completely enveloped by the imbricating bases of the foliaceous bracts, the apex with 1 or 2 long-petiolate, slender, plicate

leaves; in plants without pseudobulbs, the several slender, plicate leaves resembling those of a *Bletia*, more or less contracted at the base into a short, sheathing petiole, the basal portions of which are enveloped in several imbricating bracts. Inflorescences lateral, erect, slender racemes, usually more or less equaling the leaves, produced from the base of the current season's growth. Flowers few to many, of moderate size, on short pedicels. Sepals subequal, free, more or less spreading, the laterals usually somewhat broader. Petals subequal to the dorsal sepal or a little less. Lip 3-lobed, contracted at the base into a short claw which is adnate to, or apparently articulated with, the foot of the column, the lateral lobes erect or somewhat spreading, the mid-lobe spreading, rounded or subquadrate, or subreniform, entire, or broadly 2-lobed; disk between the lateral lobes with a thickened callus. Column short, semi-terete, somewhat arcuate, the apical margins projecting and forming a short hood over the clinandrium, the base produced into a short, broad foot. Anther terminal, operculate, incumbent, 1-celled; pollinia 2, waxy.

A South American and West Indian genus previously unrecorded from Panama.

1. KOELLENSTEINIA KELLNERIANA Rchb. f. in Bonplandia 2:17. 1854.

Warrea graveolens Hort. ex Rchb. f. Xenia Orch. 1:65. 1854.

Erect terrestrial herbs, with small, subterete or tetragonous, tapering pseudobulbs 2-3 cm. long and 4-6 mm. wide. Leaves 1 or 2, linear-lanceolate, plicate, acute or acuminate, the bases contracted into a long petiole, 45-70 cm. long and 10-15 mm. wide. Inflorescences erect, 40-60 cm. tall, produced from the base of the current flush of new growth, the peduncle provided with several distant, papery, tubular, acute or acuminate bracts. Flowers of moderate size, few to many, reminiscent of those of a small *Cyrtopodium* or *Warrea*. Sepals rather fleshy, free, subequal, green, the dorsal sepal incurved, rather concave, elliptic-lanceolate, acute, 10-12 mm. long and 4-5 mm. wide, laterals somewhat spreading, rather obliquely elliptic-lanceolate, acute, 10-12 mm. long and 5-6 mm. wide. Petals subequal to the dorsal sepal, submembranaceous, pale green, elliptic-lanceolate, acute, 9-10 mm. long and 3.5-4 mm. wide. Lip rather fleshy, 3-lobed, white transversely barred lavender or purple, 6-8 mm. long and 8-10 mm. wide when spread out, the base abruptly contracted into a short claw which apparently is articulated with the foot of the column, lateral lobes obliquely rhombic-triangular, obtuse, erect, the mid-lobe broadly spreading, somewhat concave, more or less transversely oblong-reniform, the apex sometimes shallowly emarginate; disk with a low, fleshy, tuberculate callus. Column short, stout, semi-terete, rather arcuate, 3-4 mm. long, the margins of the apex slightly projecting and forming a short hood over the clinandrium.

Panama, Colombia, Venezuela, British Guiana, and Brazil.

PANAMÁ: grassy ridges, vic. Cerro Jefe, hills east of Panama City, 2500 ft., *Rolland Jones s. n.* (under *Allen 3791*). COCLÉ: Loma del Tigre, hills north of El Valle de Antón, 3000 ft., *Allen 3562*.

61. ZYGOPETALUM Hook.

ZYGOPETALUM Hook. in Bot. Mag. t. 2748. 1827; Benth. & Hook. Gen. Pl. 3:542. 1883.

Zygopetalon Rchb. Consp. 69. 1828.

Galeottia A. Rich. in Ann. Sci. Nat. Bot. III, 3:25. 1845.

Epiphytic or terrestrial herbs. Pseudobulbs ovoid or subcylindric, tapering, the bases enveloped in several short or elongate, non-foliaceous or foliaceous bracts, the apex with 1 or 2 lanceolate or elliptic-lanceolate, plicate leaves. Inflorescences short or elongate, erect, racemose, produced from the base of the current growth; scape bracts small or large. Flowers few to many, small, or large and conspicuous. Sepals subequal, spreading, free or slightly connate at the base, the laterals adnate to the foot of the column, forming a short, broad mentum. Petals subequal to the sepals. Lip conspicuously or obscurely 3-lobed, the base affixed to, or articulated with, the column foot, the lateral lobes spreading or erect, the mid-lobe broadly spreading, or the apex strongly recurved; the disk with a prominent, fleshy, often lunate, tuberculate or cristate callus. Column rather short, stout, semi-terete, somewhat arcuate, the apex with or without conspicuous lateral wings, the base produced into a short foot. Anther terminal, operculate, incumbent, 2-celled; pollinia 4, waxy.

A polymorphic genus of American epiphytic and terrestrial herbs, ranging from southern Mexico to Peru and Brazil.

- a. Plants epiphytic. Flowers large and conspicuous; lip 3-lobed, the margins fimbriate..... 1. *Z. GRANDIFLORUM*
 aa. Plants terrestrial. Flowers small; lip subpandurate, the margins entire.... 2. *Z. PARVIFLORUM*

1. ZYGOPETALUM GRANDIFLORUM (A. Rich.) Benth. & Hook. ex Hemsl. Biol. Centr.-Amer. Bot. 3:251. 1883.

Galeottia grandiflora A. Rich. in Ann. Sci. Nat. Bot. III, 3:25. 1845.

Batemannia grandiflora Rchb. f. in Bonplandia 4:323. 1856.

Epiphytic herbs, with ovoid, somewhat furrowed pseudobulbs 3.5–6 cm. long and 2–3 cm. wide, enveloped at the base in 3–4 papery, imbricating bracts; the apex of the pseudobulbs with 2 elliptic-lanceolate, plicate, acute leaves 25–50 cm. long and 4–6.5 cm. wide. Inflorescences 15–18 cm. tall, produced from the base of the current flush of new growth. Flowers 1 to about 5, large and conspicuous, the pedicels subtended by broad, spathaceous, papery bracts. Sepals subequal, spreading, the apices recurved, green striped reddish brown, dorsal sepal free, lanceolate-acuminate, 3.0–4.5 cm. long and 1.0–1.5 cm. wide, laterals connate at the base and adnate to the foot of the column, forming a gibbose mentum, rather obliquely lanceolate, acuminate, 3.0–4.5 cm. long and 1.2–1.8 cm. wide. Petals subequal to the sepals, obliquely falcate, acuminate, spreading, the broad bases adnate to the sides of the column foot, the apices recurved, green striped reddish-brown, 3.0–4.0 cm. long and 1.2–1.8 cm. wide. Lip conspicuously 3-lobed, ab-



Fig. 175. *Zygopetalum grandiflorum*

(418)

ruptly contracted at the base, with a short claw which is articulated with the column foot, white with dull red or purple longitudinal markings, lateral lobes erect, rather obliquely acute, with fimbriate margins, mid-lobe obovate, acuminate, somewhat concave, the attenuate apex strongly recurved, the lateral margins fimbriate; disk between the lateral lobes with a broad, erect, lunate, prominently ridged and furrowed, multi-denticulate callus. Column broad, stout, arcuate, 1.5–2 cm. long, the apex with 2 short, denticulate processes on either side of which are 2 subfalcate, obliquely obtuse wings with ciliate apical margins; the base of the column produced into a short, broad foot.

Mexico, Guatemala, Costa Rica, and Panama.

CHIRIQUÍ: vic. Cerro Punta, headwaters of the Río Chiriquí Viejo, 2000 m., *Allen 3604*.

2. *ZYGOPETALUM PARVIFLORUM* L. Wms. apud Woodson & Schery, in *Ann. Mo. Bot. Gard.* 28:424, *t.* 25. 1941.

Erect, robust, terrestrial herbs, with slender, subcylindric, tapering pseudobulbs 6–9 cm. tall and about 1.5 cm. wide; leaves and blades of the foliaceous bracts linear-lanceolate to elliptic-lanceolate, plicate, acute or acuminate, the bracts contracted at the base into a short sheathing petiole, the imbricating bases completely enveloping the small pseudobulb. Leaves 30–70 cm. long and 2.5–7 cm. wide. Inflorescences 60–80 cm. tall, produced from the basal portion of the current flush of new growth. Flowers several or many, among the smallest in the genus, described as "purple, the lip violet; column white." Sepals subequal, rather fleshy, spreading, oblong-ovate, acute, 7–10 mm. long and 3.5–5 mm. wide. Petals subquadrate, obtuse, 7–8 mm. long and 4–4.5 mm. wide. Lip obscurely 3-lobed, subquadrate, panduriform, 7–8 mm. long and 5–6 mm. wide, abruptly contracted at the base, with a short claw which is articulated with the column foot, lateral margins rounded and spreading, mid-lobe rectangular, abruptly truncate, spreading; the disk with a broad, transverse, subreniform, fleshy callus. Column short, semi-terete, somewhat dilated at the apex, 4–5 mm. long. Anther and pollinia typical of the genus.

Panama.

CHIRIQUÍ: vic. Bajo Chorro, headwaters of the Río Caldera, 1900 m., *Woodson & Schery 605*; vic. Bajo Chorro, in rain forest, 6000 ft., *Davidson 345*.

62. *CHONDRORHYNCHA* Lindl.

CHONDRORHYNCHA Lindl. in *Orch. Linden.* 12. 1846; *Rchb. f. in Walp. Ann.* 6:663. 1863; *Benth. & Hook. Gen. Pl.* 3:548. 1883.

Kefersteinia *Rchb. f. in Bot. Zeit.* 10:633. 1852.

Warszewiczella *Rchb. f. loc. cit.* 635. 1852.

Warszewiczella *Rchb. f. Xenia Orch.* 1:61. 1858.

Warszewiczella *Benth. & Hook. Gen. Pl.* 3:543. 1883.

Tufted epiphytic herbs without pseudobulbs. Leaves distichously arranged in the form of an open fan, erect or arching, plicate, lanceolate, acute or acuminate, contracted below into conduplicate petioles. Inflorescences slender, erect, arching or semi-pendulous, 1-flowered, scapose, less than half the length of the leaves, produced from the axils of the lower leaves or bracts. Flowers small to large and conspicuous. Sepals subequal, free, spreading, membranaceous, the dorsal sepal erect, the laterals often retrorse, obliquely inserted on the short column foot. Petals usually spreading, subequal to the dorsal sepal or broader. Lip usually cucullate, obovate, suborbicular or subquadrate, sometimes obscurely or conspicuously 3-lobed, the lateral lobes or margins erect, or the lip explanate and divided into a narrow basal and a broad apical part, contracted at the base and adnate to, or articulated with, the very short column foot, sometimes forming a very short mentum; disk with a broad or narrow, more or less fleshy callus, the apex free and usually denticulate, or rarely with the basal callus conspicuously pedicellate, the apex scutellate. Column semi-terete, slender or broadly clavate above, sometimes narrowly winged, the ventral surface with or without a keel, rarely with a broad, 2-lobed plate below the stigma, the base of the column produced into a very short foot. Anther terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 4, waxy.

- a. Lip explanate, subpendulate, never concave or cucullate, divided into narrower basal and broader apical parts..... 1. *C. AROMATICA*
- aa. Lip concave or cucullate, entire or 3-lobed, suborbicular or obovate when spread out.
- b. Lip entire when spread out. (See also alternate bb)
- c. Flowers small; lip 1.2 cm. long or less.
 - d. Basal callus conspicuously pedicellate, the apex 2-scutellate..... 3. *C. COSTARICENSIS*
 - dd. Basal callus sessile, the free apex bifid..... 5. *C. LACTEA*
- cc. Flowers relatively large and conspicuous; lip 2.5 cm. long or more.
 - d. Lateral margins of the basal callus erect, thickened, and confluent with the erect incurving lateral margins of the lip. Lowland species..... 6. *C. MARGINATA*
 - dd. Lateral margins of the basal callus not erect, not thickened, nor confluent with the incurving lateral margins of the lip. Highland species.
 - e. Basal callus linear, the free apex bifid..... 2. *C. CALOGLOSSA*
 - ee. Basal callus radiate, digitate, the free projecting apex with 5-7 elongate teeth of unequal length..... 4. *C. DISCOLOR*
- bb. Lip obscurely or conspicuously 3-lobed when spread out, 2.5 cm. long or more.
 - c. Lateral margins of the basal callus erect, thickened, and confluent with the erect incurving lateral margins of the lip. Lowland species..... 6. *C. MARGINATA*
 - cc. Lateral margins of the basal callus not erect, not thickened, nor confluent with the erect incurving lateral margins of the lip. Highland species.
 - d. Basal callus linear, with a free bifid apex..... 2. *C. CALOGLOSSA*
 - dd. Basal callus radiate, digitate, the free projecting apex with 5-7 elongate teeth of unequal length..... 4. *C. DISCOLOR*

1. *CHONDRORHYNCHA aromatica* (Rchb. f.) P. H. Allen, comb. nov.*Zygopetalum aromaticum* Rchb. f. in Bot. Zeit. 10:668. 1852.*Warszewiczella aromatica* Rchb. f. in Walp. Ann. 6:654. 1863.*Zygopetalum Wendlandi* Rchb. f. Beitr. Orch. Centr.-Amer. 74. 1866.*Bollea Wendlandiana* Hort. ex Gard. & For. 1:315. 1888.*Warszewiczella Wendlandi* (Rchb. f.) Schltr. in Beih. Bot. Centralbl. 36²:494. 1918.

Erect tufted epiphytic herbs without pseudobulbs. Leaves linear-ligular to elliptic-lanceolate, plicate, acute or shortly acuminate, 15–30 cm. long and 1.5–2.5 cm. wide. Inflorescences erect or arching 1-flowered scapes 7–9 cm. long, from the axils of the non-foliateous basal bracts. Flowers relatively large and conspicuous. Sepals subequal¹, free, spreading, pale green or yellowish green, the dorsal sepal elliptic-lanceolate, acuminate, 2.5–3 cm. long and .6–.8 cm. wide, the laterals lanceolate, acuminate, 2.8–3.2 cm. long and .9–1.0 cm. wide. Petals subequal to the dorsal sepal, spreading, pale or yellowish green, lanceolate, acuminate, 2.5–3 cm. long and .5–.6 cm. wide. Lip explanate, subpandurate, the base obscurely lobed, abruptly contracted into a short claw, lavender or violet, usually with white margins, 2.2–2.5 cm. long and 1.5–1.7 cm. wide, divided into a more or less rectangular basal half and a broader undulate and reflexed apex; disk with a lunate to radiate or rhombic, spreading, plurisulcate, violet-blue callus. Column short, erect, white, semi-terete below, the apex clavate and narrowly winged. Anther terminal, operculate, incumbent, 1-celled.

Costa Rica and Panama.

CHIRIQUÍ: without definite locality, 4000–5000 ft., Powell 248.

The flowers of our specimens seem to be somewhat smaller than typical Costa Rican material, but otherwise are identical.

2. *CHONDRORHYNCHA caloglossa* (Schltr.) P. H. Allen, comb. nov.*Warszewiczella caloglossa* Schltr. in Fedde Rep. Sp. Nov. 12:216. 1913.*Chondrorhyncha estrellensis* Ames, Sched. Orch. 4:54. 1923.

Erect tufted epiphytic herbs without pseudobulbs, 23–28 cm. tall, the plants typical of the genus. Inflorescences erect or arching, 1-flowered scapes 10–15 cm. long, from the axils of the lower foliaceous bracts. Flowers relatively large and conspicuous. Sepals subequal, membranaceous, free, white or pale yellow, the dorsal sepal erect, lanceolate, acute or acuminate, 2.8–3.2 cm. long and .6–.7 cm. wide, laterals obliquely inserted, deflexed, concave, lanceolate, acute or acuminate, 3–3.5 cm. long and .6–.7 cm. wide. Petals spreading, white or pale yellow, elliptic-oblancoate, acute, 3–3.5 cm. long and 1.2–1.4 cm. wide. Lip concave, entire or obscurely or conspicuously 3-lobed when spread out, white or pale yellow, reticulated purple, 2.8–3.5 cm. long and 2–2.5 cm. wide; disk smooth, with a linear-ligular yellow callus, the free projecting apex bifid. Column semi-terete, 1.2–1.4 cm. long. Anther and pollinia typical of the genus.

Costa Rica and Panama.

CHIRIQUÍ: humid forest around Los Sigüas Camp, southern slope of Cerro Horqueta, 1700 m., *Pittier 3176*; Cuesta de las Palmas, Cerro Horqueta, 1700–2100 m., *Pittier 3214*, *Maxon 5510*; vic. Bajo Chorro, rain forest, 6000 ft., *Davidson 93*; trail from Cerro Punta to the headwaters of the Río Caldera, 2250–2500 m., *Allen 1462*.

A somewhat variable species, the flowers reminiscent of those of *Chondrorhyncha discolor*, but readily separable by the reticulated color pattern and narrow, bifid callus of the lip.

3. *CHONDRORHYNCHA costaricensis* (Schltr.) P. H. Allen, comb. nov.

Kefersteinia costaricensis Schltr. in Beih. Bot. Centralbl. 36²:413. 1918.

Dwarf tufted epiphytic herbs without pseudobulbs, 12–18 cm. tall. Leaves plicate, lanceolate, acuminate, 10–18 cm. long and 1.5–2 cm. wide. Inflorescences of slender, arching or semi-pendulous scapes 2.5–4 cm. long, from the base of the leaves. Flowers small, solitary. Sepals subequal, spreading, white or cream, the dorsal sepal elliptic-lanceolate, acute or subacute, 8–10 mm. long and 4–5 mm. wide, lateral sepals rather obliquely elliptic-lanceolate, acute or apiculate, 10–12 mm. long and 5–6 mm. wide. Petals subequal to the dorsal sepal, white or cream, often spotted maroon, obliquely oblong, acute, 7–9 mm. long and 4–5 mm. wide. Lip entire, suborbicular, contracted at the base and adnate to the foot of the column, 8–10 mm. long and 7–8 mm. wide, white or cream, spotted maroon, the apex entire or with an obtuse apicule; disk with an erect pedicellate callus, the apex 2-scutellate. Column erect, 5–7 mm. long, the apex broadly clavate, the ventral surface with a longitudinal keel which is expanded into a broad biauriculate, abruptly apiculate plate below the narrow transverse stigma. Anther terminal, operculate, incumbent, 1-celled.

Costa Rica and Panama.

COLÓN: Río Llano Sucio, vic. Puerto Pilón, about 65 m., *H. P. Butcher s. n.* (under *Allen 2457*).

Known in Panama from a single fragmentary specimen preserved in liquid. Our material shows some slight differences from the Costa Rican type, notably in the subrhombic rather than scutellate divisions of the apex of the basal callus, and the apparently fleshier winged plate below the stigma, which has a more prominent central spur or apicule. Although it has been decided to consider our specimen as representing *Chondrorhyncha costaricensis*, it would seem well to note that this, and apparently one or two other species from outside our range, exhibit a radical departure from the typical concept of either *Chondrorhyncha* or *Kefersteinia* in the conspicuously pedicellate basal callus of the lip and the broad plate on the under-side of the column below the stigma. It seems possible that these may actually represent an unrecognized entity of generic rank. Unfortunately, these characters are not always easily seen in dried specimens. However, the necessity for adequate material to show points of difference in no way alters the basic fact that they may exist.

Due to our present very limited and somewhat fragmentary material, it is thought best to follow established usage for the purposes of this treatment.

4. *CHONDRORHYNCHA discolor* (Lindl.) P. H. Allen, comb. nov.

Warrea discolor Lindl. in Jour. Hort. Soc. Lond. 4:265. 1849.

Warszewiczella discolor (Lindl.) Rchb. f. in Bot. Zeit. 10:636. 1852.

Zygopetalum discolor (Lindl.) Rchb. f. in Walp. Ann. 6:655. 1861.

Erect, tufted, epiphytic or pseudo-terrestrial herbs without pseudobulbs, 20–35 cm. tall, the plants typical of the genus. Inflorescences of slender, erect or arching, 1-flowered scapes 7–15 cm. long, produced from the axils of the lower non-foliaceous bracts. Flowers relatively large and conspicuous, sometimes nodding. Sepals membranaceous, subequal, free, spreading, white, often with yellowish apices, dorsal sepal erect, elliptic-lanceolate, acute, the apex recurved, 2.8–3 cm. long and 1.0–1.5 cm. wide, laterals deflexed, concave, lanceolate, acute, 3–3.2 cm. long and .8–1.0 cm. wide. Petals spreading, elliptic, obtuse to subacute, white, often suffused with purple toward the apex, 2.5–3 cm. long and 1.2–1.5 cm. wide. Lip cucullate, obscurely to conspicuously 3-lobed when spread out, 2.5–3.2 cm. long and 2.2–3 cm. wide, deep violet-purple, sometimes with narrow whitish margins, lateral lobes or margins erect and incurving over the column, the apex suborbicular and slightly retuse; disk with a radiate, digitate, plurisulcate callus, the free projecting apex with elongate teeth of unequal length. Column short, semiterete, narrowly clavate, 10–12 mm. long, white, sometimes blotched with purple. Anther and pollinia typical of the genus.

Cuba, Costa Rica, and Panama.

CHIRIQUÍ: without definite locality, 4500–5500 ft., *Powell 155*; upper Río Chiriquí Viejo, vic. Monte Lirio, *G. White 42*; llanos and slopes of Chiriquí Volcano and along the Río Chiriquí Viejo, 1200 m., *Allen 914*.

A very frequent species of the Chiriquí highlands, where the plants are often found in association with those of *Odontoglossum Schlieperianum*, as epiphytes on low trees or sometimes as pseudo-terrestrials on boulders and steep mossy banks.

5. *CHONDRORHYNCHA LACTEA* (Rchb. f.) L. Wms. in *Caldasia* 5:16. 1942.

Zygopetalum lacteum Rchb. f. in Gard. Chron. 1290. 1872.

Kefersteinia lactea Rchb. f. apud B. D. Jackson in Index Kew. 2:4. 1895.

Epiphytic herbs without pseudobulbs, the plants usually consisting of tufted clusters of several distichous crowns of relatively broad plicate leaves, which are oblong to elliptic-lanceolate, acute, 6–12 cm. long and 1.2–2 cm. wide, the basal portions somewhat contracted into a stout petiole. Inflorescences very short, filiform, more or less arching, or erect scapes about 1.5 cm. long, produced from the lower leaf axils. Flowers small, solitary. Sepals subequal, free, spreading, elliptic-lanceolate, obtuse to subacute, 8–10 mm. long and 3–4 mm. wide. Petals subequal to the sepals, elliptic-lanceolate, acute, 7–9 mm. long and 3–4 mm. wide. Lip undivided, suborbicular, 6–10 mm. long and 6–10 mm. wide when spread out,

abruptly contracted at the base into a short claw which is apparently articulated with the base of the column, the apex entire, shallowly emarginate or with an obtuse apicule; disk with a low, fleshy, sessile, bifid callus. Column semi-terete, 5-6 mm. long, the ventral surface below the stigma with a longitudinal keel. Anther and pollinia typical of the genus.

Costa Rica and Panama.

CHIRIQUÍ: without definite locality, *Wallis s. n.*

The species was described by Reichenbach from plants presumably collected in Chiriquí Province, the actual locality being unknown. Since there have been several subsequent collections from the Pacific slope in adjacent Costa Rica, there is every reason to believe that this rather obscure record may be good.

6. *CHONDORHYNCHA marginata* (Rchb. f.) P. H. Allen, comb. nov.

Warszewiczella marginata Rchb. f. in Bot. Zeit. 10:636. 1852.

Huntleya marginata Hort. ex Rchb. f. loc. cit. 1852.

Warrea marginata Rchb. f. loc. cit. 1852.

Warrea quadrata Lindl. in Gard. Chron. 647. 1853.

Warszewiczella velata Rchb. f. in Bot. Zeit. 23:99. 1865.

Zygopetalum quadratum Pfitz. Verh. Morph. Orch. 58. 1881.

Chondrorhyncha Lipscombiae Rolfe, in Kew Bull. 133. 1912.

Tufted epiphytic herbs without pseudobulbs. Leaves 5-7, linear, elliptic-ob lanceolate, acute, 12-30 cm. long and 2-4.5 cm. wide, firm, arching, contracted below into conduplicate petioles the lowest pair being little more than foliaceous bracts. Inflorescences of slender, arching or semi-pendulous, 1-flowered scapes, 5.5-10 cm. long, from the axils of the lowest non-foliaceous bracts. Flowers the largest of the genus in Panama, with a very agreeable and characteristic fragrance during the morning hours, reminiscent of cinnamon or cloves. Sepals subequal, free, membranaceous, elliptic-lanceolate, acute, white, the dorsal sepal erect, somewhat concave, the apex recurved, 2.2-3 cm. long and .9-1.2 cm. wide, the laterals usually more or less conduplicate, obliquely reflexed, 2.8-3.2 cm. long and .8-1.0 cm. wide. Petals membranaceous, spreading, white, usually with a lavender median line, elliptic-lanceolate, acute, 2.5-3 cm. long and 1.0-1.2 cm. wide, the apices recurved. Lip white, with a conspicuous pattern of radiating, often divaricate, lavender or pinkish lavender lines, cucullate, subquadrate to obscurely 3-lobed when spread out, 3.5-4.5 cm. long and 3-3.5 cm. wide, contracted at the base and adnate to the short column foot, the lateral lobes or margins erect and incurved over the column, the frontal margin broadly spreading, often suffused with lavender or pinkish lavender, entire, or emarginate at the apex; the disk between the erect lateral lobes or margins with a broadly spreading, fleshy, pluri-sulcate callus, white striped lavender, the lateral margins of which are thickened and confluent with the erect lateral lobes of the lip and the apex more or less broadly truncate, free, the many short projecting teeth all of about equal length. Column semi-terete below, dilated and broadly clavate above, pure white, 12-18 mm. long. Anther terminal, operculate, incumbent, 1-celled.

Fig. 176. *Chondrorhyncha marginata*

Panama and Colombia.

CANAL ZONE: Cacao Plantation, near Summit, *Lipscomb s. n.*; Summit, *Powell 3483*; Barro Colorado Island, *J. Zetek s. n.*; vic. Frijoles, *Powell 3460*; Gatún Lake region, *Powell 11, 47*; Cacao Plantation, vic. Summit, *Florence & James Barrett s. n.* PANAMÁ: western arm of the Quebrada Salamanca, 70 m., *Dodge, Steyermark & Allen 16989*. COCLÉ: damp shaded valleys south of El Valle de Antón, 600 m., *Allen 2843*.

A fairly frequent and attractive species, found in damp shaded locations usually at low elevations.

63. PESCATOREA Rchb. f.

PESCATOREA Rchb. f. in Bot. Zeit. 10:667. 1852; Benth. & Hook. Gen. Pl. 3:543. 1883.

Erect, tufted, epiphytic herbs without pseudobulbs. Leaves plicate, contracted below into conduplicate imbricating petioles, which are distichously arranged in the form of an open fan. Inflorescences of short, slender, arching, 1-flowered scapes produced from the axils of the non-foliaceous basal bracts. Flowers relatively large and conspicuous. Sepals more or less fleshy, subequal, concave, the dorsal sepal erect, free, the laterals connate at the base and obliquely inserted on the column foot. Petals subequal to the sepals. Lip rather fleshy, 3-lobed, abruptly contracted at the base into a conspicuous ligular claw which is continuous with the foot of the column, the limb forming an obtuse angle with the column foot, the base apparently with a deep concavity below the column, surrounded by an erect semicircular plurisulcate callus; apical lobe of the lip more or less convex or ventricose, the lateral margins often recurved. Column stout, semi-terete, produced at the base into a short foot. Anther terminal, operculate, incumbent, 1-celled; pollinia 4, waxy.

A small genus of tufted pseudobulbless epiphytes, ranging from Costa Rica to Colombia. The genus is sometimes considered as being referable to *Warscewiczella*, and has been so treated in the main generic key.

In the exceedingly perplexing association of closely allied generic concepts embracing *Bollea*, *Chondrorhyncha*, *Kefersteinia*, *Huntleya*, *Pescatorea*, *Warscewiczella*, and *Zygopetalum*, it becomes largely a matter of individual opinion which are to be rejected and which retained. Probably something very nearly approaching a logical treatment of the situation was proposed by Reichenbach *filius* (in Walp. Ann. 6:650-662. 1863) in his reduction of nearly all of these to sections of *Zygopetalum*. This solution has never been universally accepted, however, the more recent tendency being to recognize some as valid genera and to reduce others to synonymy. Here, as in most other cases of a similar nature, no hard-and-fast rule can be applied. Most genera, when examined critically, are found to be more or less arbitrary segregations, and should be recognized as being conveniences and a means to an end.

Dr. Louis O. Williams has suggested that *Kefersteinia* is referable to *Chondrorhyncha*, a view in which I, for the most part, concur since the generic type,

K. graminea (Lindl.) Rchb. f., and most of the subsequently described species are structurally nearly identical with *Chondrorhyncha*; yet there are other Kefersteinias, notably *K. costaricensis* Schltr., which differ radically from this generic concept. The type species of *Warszewiczella*, *W. discolor* (Lindl.) Rchb. f., also is almost identical with the earlier *Chondrorhyncha*, and apparently should be reduced; but not including *Pescatorea*, which seems to have ample characters upon which to base segregation. For the purposes of this treatment, the following alternate key is proposed for the separation of the genera in our area:

KEY TO THE GENERA

- a. Plants with pseudobulbs. Inflorescences racemose, several- to many-flowered..... 61. ZYGOPETALUM
- aa. Plants without pseudobulbs. Inflorescences of short 1-flowered scapes.
 - b. Lip truly clawed at the base, explanate or convex, never cucullate.
 - c. Apex of the column semiterete, never with broad projecting lateral wings. Basal callus plurisulcate, never fimbriate..... 63. PESCATOREA
 - cc. Apex of the column with broad projecting lateral wings, forming a conspicuous hood over the clinandrium. Basal callus fimbriate.... 64. HUNTLEYA
 - bb. Lip obscurely clawed at the base, usually convex or cucullate, rarely explanate..... 62. CHONDRORHYNCHA

1. PESCATOREA CERINA (Lindl.) Rchb. f. in Bot. Zeit. 10:667. 1852.

Huntleya cerina Lindl. & Paxt. in Paxton's Flow. Gard. 3:62. 1852-53.

Zygopetalum cerinum (Lindl.) Rchb. f. in Walp. Ann. 6:651. 1863.

Tufted epiphytic herbs without pseudobulbs. Leaves erect or arching, plicate, subcoriaceous, linear-lanceolate to elliptic-lanceolate, acute or acuminate, 15-60 cm. long and 3-5 cm. wide. Inflorescences of short, 1-flowered, erect or arching scapes 3.5-10 cm. long, from the axils of the basal non-foliateous bracts. Flowers large and conspicuous. Sepals subequal, rather fleshy, concave, spreading, the dorsal sepal free, white, linear-elliptic to obovate, obtuse, 2.5-3.2 cm. long and 1.6-1.8 cm. wide, laterals somewhat connate at the base, obliquely inserted on the column foot, white with a long greenish-yellow blotch near the base, elliptic-lanceolate to oblanceolate, obtuse, 2.5-3.5 cm. long and 1.8-2 cm. wide. Petals spreading, subequal to the dorsal sepal, white, inserted on the base of the column, spatulate to oblanceolate, obtuse, 2.5-3 cm. long and 1.5-1.8 cm. wide. Lip rather fleshy, 3-lobed, 2-3 cm. long and about 2.5 cm. wide, rich yellow, the basal callus marked reddish brown, abruptly contracted at the base into a conspicuous ligular claw which is continuous with the column foot, the limb forming an obtuse geniculate angle with the claw, the subfalcate lateral lobes resting against the base of the column, forming a deep concavity which is surrounded by a conspicuous erect, semicircular, plurisulcate callus, the frontal lobe convex to slightly ventricose, the apical margins often reflexed. Column short, stout, white, semiterete, 1.3-1.5 cm. long, produced at the base into a short foot. Anther terminal, lavender.

Costa Rica and Panama.

PANAMÁ: Cerro Campana, in cloud forest near summit, 2500-3000 ft., Allen 4447,



Fig. 177. *Pescatorea cerina*

5169. COCLÉ: vic. La Mesa, region north of El Valle de Antón, 1000 m., Allen 2362.
VERAGUAS: forested slopes of Cerro Tuté, region west of Santa Fé, 2500-3000 ft., Allen
4564, 5171. CHIRIQUÍ: without definite locality, 4500 ft., Purdom s. n.

An attractive species of the wet highland forests of the Pacific slope, usually being found in shaded situations at about 3000 ft. elevation.

64. HUNTLEYA Batem. ex Lindl.

HUNTLEYA Batem. ex Lindl. in Bot. Reg. 23: post *t.* 1991. 1837; Benth. & Hook. Gen. Pl. 3:543. 1883.

Erect, tufted, epiphytic herbs without pseudobulbs. Leaves plicate, subcoriaceous, linear-lanceolate, acute, the bases somewhat conduplicate and imbricating, distichously arranged in the form of a fan. Inflorescences of slender, elongate, erect, 1-flowered scapes produced from the axils of the central leaves. Flowers large and conspicuous. Sepals rather fleshy, subequal, spreading, the dorsal sepal free, the laterals connate at the base and obliquely inserted on the column foot. Petals rather fleshy, spreading, subequal to the sepals, inserted on the foot of the column. Lip fleshy, abruptly contracted at the base, with a conspicuous claw which forms a geniculate angle with the column foot; the basal callus with an erect, semicircular, fimbriate margin, the apical lobe articulated with the base of the callus plate. Column short, somewhat arcuate, the apex dilated, with a dorsal keel, the lateral margins broadly winged and confluent at the apex, forming a conspicuous hood over the clinandrium. Anther terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 4, waxy.

About three or four species of American epiphytes, ranging from Costa Rica to Brazil. They often are listed as *Zygopetalums*. One species is known from Panama.

1. HUNTLEYA MELEAGRIS Lindl. in Bot. Reg. 23: post *t.* 1991. 1837.

Batemannia Burtii Endres & Rchb. f. in Gard. Chron. 1099. 1872.

Zygopetalum meleagris Benth. in Jour. Linn. Soc. 18:321. 1880.

Zygopetalum Burtii Benth. & Hook. ex Hemsl. Biol. Centr.-Amer. Bot. 3:251. 1883.

Huntleya Burtii (Endres & Rchb. f.) Rolfe, in Orch. Rev. 24:236. 1916.

Erect, tufted, epiphytic herbs without pseudobulbs. Leaves plicate, subcoriaceous, linear-lanceolate to elliptic-lanceolate, acute, 15–30 cm. long and 3–4.5 cm. wide. Inflorescences of erect 1-flowered scapes 10–15 cm. tall produced from the axils of the central leaves. Flowers large and conspicuous. Sepals subequal, fleshy, spreading, elliptic-lanceolate, acute to acuminate, the margins undulate, the apical $\frac{2}{3}$ a waxy reddish brown, usually with some yellow spots, the basal $\frac{1}{3}$ white or pale yellow, the dorsal sepal free, 4–6 cm. long and 2–2.5 cm. wide, the laterals connate at the base and obliquely inserted on the column foot, 4.5–6 cm. long and 1.5–2.5 cm. wide. Petals fleshy, spreading, subequal and colored similarly to the sepals, with purple blotches or streaks at the base near the insertion on the column foot, broadly elliptic-lanceolate, acuminate, with undulate margins, 3.5–5.6 cm. long and 2–3 cm. wide. Lip fleshy, the base nearly white or yellowish, the frontal half of the apical lobe usually a rich waxy reddish brown or brownish purple, 2.5–3.5 cm. long and 2–3 cm. wide, the base of the lip abruptly contracted, with a conspicuous claw which forms a geniculate angle with the foot of the column, the basal callus with an erect semicircular fimbriate crest, the posterior margins of which are incumbent on the foot of the column, the apical lobe obscurely 3-



Fig. 178. *Huntleya meleagris*

lobulate, obovate, acute to acuminate, contracted at the base and articulated with the apex of the callus plate, the lateral lobules rounded, spreading, the apical lobule broadly triangular, the acuminate apex recurved. Column stout, erect, 1.5-2 cm. long, semiterete below, dilated above, with a conspicuous dorsal keel and broad lateral wings which are confluent at the apex, forming a hood over the clinandrium. Anther terminal, operculate, incumbent, imperfectly 2-celled.

Costa Rica, Panama, Colombia, and Brazil.

COCLÉ: western slope and summit of Cerro Valle Chiquito, 700-800 m., *Seibert 643*; trail to Las Minas, region north of El Valle de Antón, 1000 m., *Allen 2894*.

A rare species of the wet highland forests, growing in deep shade at elevations above 2500 ft. The plants are often associated with a *Brassia* of nearly identical vegetative appearance, and are exceedingly difficult to distinguish when not in flower. The conduplicate bases of the leaves of the *Brassia* are often slightly broader below the suture line, while those of the *Huntleya* are of uniform width. The Central American plants have hitherto been called *Huntleya Burtii*, but other than some slight difference in size and color our material seems identical with specimens collected in Brazil.

65. MAXILLARIA Ruiz & Pavon

MAXILLARIA Ruiz & Pavon, Fl. Peruv. & Chil. Prodr. 116, t. 25. 1794; Lindl. in Bot. Reg. n. s. 6: Misc. 10. 1843; Benth. & Hook. Gen. Pl. 3:555. 1883.

Ornithidium Salisb. in Trans. Hort. Soc. Lond. 1:293. 1812.

Camaridium Lindl. in Bot. Reg. 10: t. 844. 1824.

Psittacoglossum La Llave & Lex. Nov. Veg. Desc. 2:29. 1825.

Heterotaxis Lindl. in Bot. Reg. 12: t. 1028. 1826.

Dicrypta Lindl. Gen. & Spec. Orch. Pl. 44. 1830.

Menadena Raf. Fl. Tellur. 2:98. 1836.

Onkeripus Raf. loc. cit. 4:42. 1836.

Pentulops Raf. loc. cit. 4:42. 1836.

Epiphytic herbs with very short to elongate, often branching, erect, arching or pendulous stems, with or without clustered or distant, 1- to 3-leaved pseudobulbs. Leaves persistent, conduplicate in veneration, usually coriaceous or fleshy, rarely thin, usually strap-shaped, without prominent veins. Inflorescences of 1 to many, reduced to elongate, 1-flowered scapes from the bases of the pseudobulbs, from the axils of the leaves, or the flush of new growth. Flowers small to large and conspicuous. Sepals subequal, free, or the laterals somewhat connate at the base, adnate to the foot or base of the column, often forming a short mentum. Petals subequal to the sepals or somewhat smaller. Lip concave, 3-lobed or entire, sessile or contracted at the base into a short claw, articulated with or adnate to the foot or base of the column, lateral lobes or margins erect, the mid-lobe membranaceous or thickened, spreading or reflexed; disk rarely without a fleshy callus. Column erect, semi-terete, somewhat arcuate, not winged, the base with a short foot, or footless. Anther terminal, operculate, incumbent, 1-celled or imperfectly 2-celled; pollinia 4, waxy.

About 250 species of tropical American epiphytes, ranging from Mexico to Peru, Brazil, and the West Indies. As would be expected from a large group of plants having a great geographic range, they vary considerably in size and vegetative habit. The species can roughly be separated into two main divisions. In the first division the pseudobulbs are conspicuously present, either as sessile clusters or distributed along the rhizome; while in the second division the pseudobulbs are inconspicuous or entirely absent, the plants usually either erect canes with 2-ranked foliage, or with sessile clusters of leaves in the form of a fan. However, there are many species in which conspicuous pseudobulbs are at first produced at the base, the subsequent growth becoming elongate, often branching or scandent, lacking pseudobulbs, or with pseudobulbs small and hidden by the imbricating leaf bases. Plants of some of these modified types are often indistinguishable from those of *Camaridium* and *Ornithidium*, the first of which in particular is a highly technical and arbitrary generic concept. In accordance with recently accepted usage, both of these are here considered to be *Maxillarias*. At the present time, some 41 species are known from Panama.

- a. Secondary stems usually conspicuously thickened into pseudobulbs. (See also section aa.)
- b. Plants caespitose. Rhizome very short; pseudobulbs erect, usually congested (rarely solitary), apex monophyllous.
- c. Bracts enveloping the base of the pseudobulb conspicuously foliaceous.
- d. Bases of the foliaceous bracts completely covering the poorly developed pseudobulb..... 14. *M. CRASSIFOLIA*
- dd. Bases of the foliaceous bracts covering only the basal half of the well-developed pseudobulb.
- e. Plants small. Foliaceous bracts 1-2. Sepals 5 mm. wide or less. Mentum elongate..... 13. *M. CONFUSA*
- ee. Plants large. Foliaceous bracts 3 or more. Sepals 8 mm. wide or more. Mentum short..... 25. *M. M/LEOLENS*
- cc. Bracts enveloping the bases of the pseudobulbs not or apparently not foliaceous.
- d. Mid-lobe of the lip $\frac{1}{2}$ or more of the total length of the lip.
- e. Apices of the lateral lobes of the lip acute, conspicuously projecting..... 35. *M. RUFESCENS*
- ee. Apices of the lateral lobes of the lip not acute, not conspicuously projecting..... 16. *M. CUCULLATA*
- dd. Mid-lobe of the lip less than $\frac{1}{2}$ the total length of the lip.
- e. Pseudobulbs complanate-cylindric, apparently continuous with the leaf petiole..... 5. *M. ARACHNITIFLORA*
- ee. Pseudobulbs ovoid to elliptic-ovoid, compressed, but never cylindric, broader than the leaf petioles.
- f. Plants small, up to 25 cm. tall.
- g. Mid-lobe about $\frac{1}{2}$ the total length of the lip. Apex of the pseudobulb subacute..... 23. *M. LONGIPETIOLATA*
- gg. Mid-lobe about $\frac{1}{2}$ the total length of the lip. Apex of the pseudobulb broadly truncate.
- h. Mentum short, acute. Sepals acute, 15 mm. or less long..... 9. *M. BREVIPES*
- hh. Mentum elongate, acuminate. Sepals acuminate, 17 mm. or more long..... 13. *M. CONFUSA*
- ff. Plants large, more than 25 cm. tall (usually much taller).
- g. Flowers relatively large. Sepals 4 cm. or more long.
- h. Sepals obtuse to subacute, about 10 mm. wide..... 24. *M. LUTEO-ALBA*
- hh. Sepals acuminate, about 6 mm. wide..... 3. *M. ANCUSTISEGMENTA*
- gg. Flowers relatively small. Sepals 3.5 cm. or less long.

- h. Mid-lobe about $\frac{1}{2}$ the total length of the lip. Apex of the pseudobulb subacute..... 23. *M. LONGIPETIOLATA*
- hh. Mid-lobe about $\frac{1}{3}$ the total length of the lip. Apex of the pseudobulb broadly truncate.
 - i. Sepals 2.5 cm. long or more..... 34. *M. RINGENS*
 - ii. Sepals 2 cm. long or less..... 32. *M. POWELLII*
- bb. Plants caulescent. Rhizomes or canes elongate, sometimes branching; pseudobulbs approximate or distant, usually inserted on the rhizome at an oblique angle, sometimes confined to the base of the plant, erect, solitary or clustered.
- c. Pseudobulbs distributed along the rhizome, approximate, the internodes not equaling the length of the pseudobulbs, often more or less imbricating (i. e., with the base of each pseudobulb covered by the apical portion of that preceding it).
- d. Flowers produced from the base of the current mature pseudobulb.
 - e. Bracts enveloping the bases of the pseudobulbs foliaceous.
 - f. Apical lobe of the lip about $\frac{2}{3}$ of the total length..... 38. *M. VAGANS*
 - ff. Apical lobe of the lip about $\frac{1}{3}$ of the total length..... 28. *M. OREOCHARIS*
 - ee. Bracts enveloping the bases of the pseudobulbs not or apparently not foliaceous.
 - f. Pseudobulbs minute, usually completely hidden by the papery imbricating bracts. Leaves very fleshy, subulate-conduplicate, rarely lanceolate-elliptic. Lip concave, entire, linear-spatulate..... 37. *M. UNCATA*
 - ff. Pseudobulbs conspicuous, not hidden by the bases of the imbricating bracts. Leaves coriaceous, ligular, or subulate-conduplicate. Lip entire or 3-lobed.
 - g. Scapes very short, in dense subsessile fascicles. Flowers enclosed in 2 conspicuous glumaceous bracts. Sepals broadly ovate, about 6 mm. long. Lip 3-lobed. Column footless..... 27. *M. NEGLECTA*
 - gg. Scapes conspicuously pedicellate, solitary or in loose fascicles. Sepals acute or obtuse. Lip entire, or obscurely 3-lobed. Column produced into a distinct foot.
 - h. Apex of the pseudobulbs 2- to 3-leaved. Scapes usually loosely fasciculate. Sepals acuminate..... 20. *M. FRIEDRICHSTHALII*
 - hh. Apex of the pseudobulbs monophyllous. Scapes usually solitary.
 - i. Leaves 25 cm. or more long. Pseudobulbs strongly ancipitous. Sepals acute to acuminate..... 28. *M. OREOCHARIS*
 - ii. Leaves 15 cm. long or less. Pseudobulbs usually not strongly ancipitous. Sepals broadly obtuse..... 40. *M. VARIABILIS*
 - dd. Flowers produced from the bract axils of the flush of new growth.
 - e. Leaves 25 cm. or more long.
 - f. Bracts of the flush of new growth acuminate. Mid-lobe of the lip conspicuously thickened..... 1. *M. ALBA*
 - ff. Bracts of the flush of new growth broadly obtuse. Mid-lobe of the lip not conspicuously thickened..... 10. *M. CAMARIDII*
 - ee. Leaves 18 cm. long or less.
 - f. Lip conspicuously 3-lobed, the mid-lobe more than $\frac{1}{2}$ the total length of the lip..... 38. *M. VAGANS*
 - ff. Lip obscurely 3-lobed, the mid-lobe about $\frac{1}{3}$ the total length of the lip..... 40. *M. VARIABILIS*
 - cc. Pseudobulbs distant to very distant on the rhizome, or confined to the base of the plant.
 - d. Pseudobulbs distant to very distant on the rhizome.
 - e. Flowering scapes produced from the axils of the current flush of new growth.
 - f. Pseudobulbs diphyllous.

- g. Leaf petioles very short, the apices of the leaves obtuse.
Bracts of the flush of new growth broadly obtuse..... 10. *M. CAMARIDIH*
 - gg. Leaf petioles elongate, the apices of the leaves acute.
Bracts of the flush of new growth acuminate..... 15. *M. CTENOSTACHYA*
 - ff. Pseudobulbs monophyllous.
 - g. Flowers minute, the sepals less than 8 mm. long.
 - h. Pseudobulbs suborbicular..... 26. *M. MINOR*
 - hh. Pseudobulbs linear..... 41. *M. WERCKLEI*
 - gg. Flowers of moderate size, the sepals more than 8 mm. long.
 - h. Pseudobulbs linear. Leaves less than 3 cm. long..... 41. *M. WERCKLEI*
 - hh. Pseudobulbs elliptic-ovate to elliptic-oblong. Leaves more than 6 cm. long.
 - i. Lip conspicuously 3-lobed when spread out.
 - j. Mid-lobe about $\frac{1}{8}$ the total length of the lip..... 1. *M. ALBA*
 - jj. Mid-lobe more than $\frac{1}{2}$ the total length of the lip.
 - k. Lateral lobes of the lip subfalcate, the mid-lobe acute to acuminate. Sepals acuminate..... 36. *M. UMBRATILIS*
 - kk. Lateral lobes of the lip rounded or broadly acute, the mid-lobe obtuse or subacute. Sepals acute..... 38. *M. VAGANS*
 - ii. Lip entire or obscurely 3-lobed, subpandurate when spread out..... 18. *M. DIUTURNA*
 - ee. Flowering scapes produced from the base of the current mature pseudobulb.
 - f. Flowers small, produced in dense sessile fascicles. Column without a foot..... 27. *M. NEGLECTA*
 - ff. Flowers of moderate size, usually 1-3, each flower solitary in the bract axil, never produced in dense sessile fascicles. Column with a distinct foot.
 - g. Leaves linear, elongate, less than 1 cm. wide. Sepals about 1.5 cm. long..... 28. *M. OREOCHARIS*
 - gg. Leaves broadly ligular, more than 3 cm. wide. Sepals about 3.5 cm. long..... 31. *M. PLANICOLA*
 - dd. Pseudobulbs confined to the base of the plant.
 - e. Flowers large and conspicuous. Sepals 3.5 cm. long or more.
 - f. Lip obscurely 3-lobed, about 1.5 cm. long..... 22. *M. INAUDITA*
 - ff. Lip conspicuously 3-lobed, about 1 cm. long..... 8. *M. BRADEORUM*
 - ee. Flowers small. Sepals 1.5 cm. long or less.
 - f. Sepals broadly ovate. Lip geniculate, sigmoid when seen in profile..... 21. *M. FULGENS*
 - ff. Sepals acute to acuminate, not broadly ovate. Lip not geniculate nor sigmoid in profile.
 - g. Lip distinctly 3-lobed, lateral lobes auriculate, erect..... 6. *M. BIOLLEYI*
 - gg. Lip entire..... 30. *M. PITTIERI*
- aa. Secondary stems not, or rarely, or obscurely thickened into pseudobulbs, or the pseudobulbs confined to the base of the plant.
 - b. Plants caespitose.
 - c. Leaf bases conduplicate, imbricating, distichously arranged in the form of a broad fan.
 - d. Leaves fleshy. Flowers with short pedicels, subsessile in the central leaf axils.
 - e. Leaves many, equitant, gladiate, acuminate. Plants pendent..... 39. *M. VALENZUELANA*
 - ee. Leaves few, ligular, acute or obtuse, the conduplicate bases completely enveloping a small pseudobulb. Plants erect.
 - f. Plants more than 15 cm. tall. Leaves more than 15 mm. wide..... 14. *M. CRASSIFOLIA*
 - ff. Plants less than 10 cm. tall. Leaves less than 10 mm. wide..... 7. *M. BRACHYBULBON*
 - dd. Leaves subcoriaceous. Flowers with long pedicels, produced from the axils of the basal conduplicate bracts..... 11. *M. CHARTACIFOLIA*
 - cc. Leaf bases contracted below into narrow sheathing petioles, or apparently so.

- d. Leaves fleshy, obtuse, with short, conduplicate, imbricating petioles. Inflorescences subsessile in the leaf axils..... 14. *M. CRASSIFOLIA*
- dd. Leaves coriaceous, acute or acuminate. Flowers usually long-pedicellate, rarely subsessile in the leaf axils.
 - e. Leaves broad, 2.5 cm. wide or more. Flowers large, the sepals 4 cm. long or more..... 5. *M. ARACHNITIFLORA*
 - ee. Leaves narrow, .8 cm. wide or less. Flowers small, the sepals 2.5 cm. long or less.
 - f. Plants dwarf, usually less than 6 cm. tall..... 7. *M. BRACHYBULBON*
 - ff. Plants elongate, leaves 45 cm. or more long..... 4. *M. ANGUSTISSIMA*
- bb. Plants caulescent, the elongate canes or rhizomes repent, erect or pendulous, sometimes with pseudobulbs at the base. Leaves 2-ranked on the stem.
- c. Canes or rhizomes undivided, or apparently so.
 - d. Plants dwarf, 15 cm. tall or less.
 - e. Leaves acute or acuminate..... 37. *M. UNCATA*
 - ee. Leaves obtuse, or the apices retuse..... 41. *M. WERCKLEI*
 - dd. Plants more than 25 cm. tall.
 - e. Leaves forming a distichous, fasciculate cluster at the apex of the stems, the imbricating bases sometimes enveloping a small pseudobulb..... 21. *M. FULGENS*
 - ee. Leaves equidistantly distributed along the upper stems, the bases not fasciculate.
 - f. Leaves 9 cm. long or less, the apex retuse. Flowers small, the sepals 1.5 cm. long or less.
 - g. Sepals about 1.5 cm. long. Lip conspicuously 3-lobed, the basal lobes auriculate, erect, the apical lobe large, broadly obtuse..... 6. *M. BIOLLEYI*
 - gg. Sepals about 1 cm. long. Lip linear, concave, rather obscurely 3-lobed, the apical lobe small, acute..... 2. *M. ALLENII*
 - ff. Leaves 15 cm. or more long, the apex broadly obtuse to acuminate. Flowers relatively large, the sepals 2.5 cm. long or more.
 - g. Lip about 9 mm. long, conspicuously 3-lobed, the lateral lobes acute, broadly triangular to subfalcate..... 8. *M. BRADEORUM*
 - gg. Lip about 15 mm. long, rather obscurely 3-lobed.
 - h. Leaves acuminate, 1.5 cm. or less wide, the bases tightly clasping the cylindric canes..... 19. *M. EXALTATA*
 - hh. Leaves broadly obtuse, 3.5 cm. or more wide, the persistent bases conspicuously flattened..... 22. *M. INAUDITA*
 - cc. Canes or rhizomes branching.
 - d. Rhizome repent, rooting freely from the bases of the caespitose leaf clusters, which are distant or terminal on the stems..... 33. *M. REPENS*
 - dd. Canes erect or pendent, not freely rooting from caespitose leaf clusters, the leaves equidistantly distributed on the stems.
 - e. Plants dwarf, 15 cm. or less tall.
 - f. Leaves coriaceous, elliptic, broadly obtuse..... 41. *M. WERCKLEI*
 - ff. Leaves fleshy, subulate-conduplicate, or rarely lanceolate, acute, never broadly obtuse..... 37. *M. UNCATA*
 - ee. Plants 30 cm. or more tall.
 - f. Canes slender. Leaves very short, 6 cm. or less long (usually much less)..... 17. *M. DENDROBIODES*
 - ff. Canes relatively stout. Leaves 10 cm. long or more.
 - g. Flowers conspicuously pedicellate; sepals over 15 mm. long. Column with a distinct foot..... 29. *M. PARVILABIA*
 - gg. Flowers in dense subsessile fascicles; sepals 10 mm. or less long. Column without a foot. Plants usually with an ovoid pseudobulb at the base.
 - h. Lip geniculate, sigmoid in profile.
 - hh. Lip not geniculate, not sigmoid in profile.
 - i. Apex of the lip 2-lobed..... 12. *M. CONDUPLICATA*
 - ii. Apex of the lip subaristate..... 30. *M. PITTIERI*

1. *MAXILLARIA ALBA* (Hook.) Lindl. Gen. & Spec. Orch. Pl. 143. 1832.*Dendrobium album* Hook. Exot. Fl. t. 142. 1823-1827.*Broughtonia alba* Spreng. Syst. Veg. 735. 1826.

Epiphytic herbs with elongate, often branching, more or less pendulous, rhizomatous stems enveloped in closely imbricating, persistent, brown, papery bracts. Pseudobulbs approximate, inserted at an acute angle on the stems and more or less imbricating, linear-elliptic, strongly ancipitous, 4-5 cm. long and 2-2.5 cm. wide, the rather oblique truncate apex with a solitary leaf. Leaves ligular, coriaceous, persistent, acuminate, 25-40 cm. long and 1.5-2 cm. wide. Inflorescences short 1-flowered scapes 3-5 cm. long from the bract axils of the flush of new growth. Flowers few to about 8, relatively small, apparently produced more or less simultaneously rather than in successive flowerings as in some of the allied species. Sepals subequal, free, spreading, creamy white, ligular, acuminate, 2-2.5 cm. long and .4-.5 cm. wide, the laterals adnate to the column foot, forming a short subacute mentum. Petals subequal to the sepals, creamy white, lanceolate, acute to acuminate, 1.8-2 cm. long and .4-.5 cm. wide. Lip concave, slightly arcuate, obscurely 3-lobed, yellow; more or less elliptic-oblancheolate, acute, when spread out, 12-15 mm. long and about 5 mm. wide, contracted at the base and articulated with the foot of the column, the lateral lobes erect, the mid-lobe about $\frac{1}{3}$ the total length of the lip, ovate, acute, somewhat thickened; disk with an elongate, ligular, fleshy callus. Column semi-terete, lightly arcuate, 7-9 mm. long, somewhat dilated and obscurely auriculate at the apex, the base produced into a distinct foot. Anther terminal, operculate, incumbent, obscurely 2-celled.

Guatemala, Honduras, Costa Rica, Panama, Cuba, Jamaica, Trinidad, British Guiana, Surinam, Brazil, and probably other adjacent territories.

PANAMÁ: hills near Panama City, sea level, *Powell* 127; vic. Juan Diaz, sea level, *Cope* s. n. (under *Allen* 3822). CHIRIQUÍ: vic. Boquete, 3800 ft., *Davidson* 826; in low woods along small streams on rocky plains about 5 miles south of Boquete, 3000 ft., *Allen* 4706.

2. *MAXILLARIA ALLENII* L. Wms. in Ann. Mo. Bot. Gard. 27:282 t. 35. 1940.

Erect epiphytic herbs without pseudobulbs, the complanate-cylindric canes 25-40 cm. tall, the lower half to two-thirds leafless and enveloped in the coarse, closely imbricating, persistent leaf bases. Leaves 2-ranked, equidistantly distributed along the upper half to third of the stem, coriaceous, ligular, emarginate, 3.5-6.5 cm. long and 1.0-2.0 cm. wide. Inflorescences slender 1-flowered scapes produced in loose fascicles from the leaf axils. Flowers small. Sepals subequal, free, not spreading, lanceolate, acute to acuminate, 7-10 mm. long and 2-2.5 mm. wide, the laterals adnate to the foot of the column, forming a very short subacute mentum. Petals subequal to the dorsal sepal, lanceolate to oblancheolate, acute, pale yellow, 6-8 mm. long and about 2.5 mm. wide. Lip slightly concave, reddish tan to reddish orange, obscurely 3-lobed, articulated at the base with the foot of the column, 6-7 mm. long and about 3 mm. wide, lateral lobes erect, the acute apices somewhat spreading, the mid-lobe about half the total length of the lip,

the acute apex somewhat thickened and with erect margins; disk with a low, fleshy, linguiform callus. Column semi-terete, somewhat arcuate, about 4 mm. long, produced at the base into a foot. Anther terminal, operculate, incumbent, 1-celled.

Panama.

PANAMÁ: forested summit of Cerro Campana, 800-1000 m., *Allen & Fairchild 3968*. COCLÉ: wet mossy forest on Cerro Pajita, hills north of El Valle de Antón, 1200 m., *Allen & Fairchild 3941*; region north of El Valle, 1000 m., *Allen 1650, 2902, 3921*.

3. *MAXILLARIA ANGUSTISEGMENTA* Ames & Schweinf. in Sched. Orch. 10:86. 1930.

Erect epiphytic herbs with stout ovate to rectangular-elliptic, somewhat compressed pseudobulbs 4-6 cm. tall and 1.5-3.5 cm. wide, the bases enveloped in several imbricating papery bracts which become fibrous with age, the truncate apex of the pseudobulb with a single leaf. Leaves coriaceous, persistent, the blades oblong, acute, contracted below into an elongate, conduplicate petiole, 16-50 cm. long and 2-5 cm. wide. Inflorescences usually several, erect, 1-flowered scapes 12-15 cm. tall, enveloped in several approximate, tubular, acuminate, papery bracts. Flowers large and conspicuous. Sepals subequal, free, widely spreading, yellow, linear-lanceolate, long-acuminate, 4.5-5.5 cm. long and .5-.6 cm. wide, the laterals adnate at the base to the foot of the column, forming a short mentum. Petals subequal to the sepals, white, linear-lanceolate, acuminate, the apices incurving, 4-4.5 cm. long and .35-.5 cm. wide. Lip 3-lobed, 12-15 mm. long, contracted at the base and articulated with the foot of the column, the lateral lobes elongate, erect, the anterior margins rounded, the mid-lobe about $\frac{1}{4}$ the total length of the lip, suborbicular to subquadrate, obtuse; the disk with a fleshy ligular callus. Column semi-terete, somewhat arcuate, 8-10 mm. long, produced at the base into a foot.

Costa Rica and Panama.

CHIRIQUÍ: without definite locality, *Terry 1610*; Bajo Mono, mouth of the Quebrada Chiquero and along the Rio Caldera, 1500-2000 m., *Woodson, Allen & Seibert 1010*.

Our specimens vary among themselves, none agreeing entirely with the Costa Rican type, yet they seem to form an association more readily referable to that concept than to any other species, differing from *Maxillaria ringens* in the larger flowers and more robust habit, and from *Maxillaria luteo-alba* in the much more attenuate floral segments. It seems likely that this, and many others of this association, will eventually be reduced to synonymy.

4. *MAXILLARIA ANGUSTISSIMA* Ames, Hub. & Schweinf. in Bot. Mus. Leaf. Harv. Univ. 3:41. 1934.

Maxillaria acutifolia Schltr. in Fedde Rep. Sp. Nov. Beih. 19:229. 1923, non Lindl.

Caespitose, usually pendulous, epiphytic herbs without pseudobulbs, the short rhizome with one to several, sometimes divaricate, clusters of long-attenuate

foliage. Leaves coriaceous, very narrow (in our specimen), 45–75 cm. long and .2–.3 cm. wide, the bases enveloped in several papery, imbricating bracts, forming a short complanate petiole. Inflorescences apparently solitary, short, 1-flowered scapes from the lower leaf axils. Sepals subequal, free, apparently not spreading (in our specimen), lanceolate, acuminate, about 2.5 cm. long and 5–6 mm. wide, the very oblique bases of the laterals adnate to the long column foot, forming a conspicuous, elongate, acuminate mentum. Petals apparently subequal to the sepals. Lip obscurely 3-lobed, concave, the slender base articulated with the column foot, the lateral lobes erect, the apical lobe spreading, about $\frac{1}{3}$ the total length of the lip; disk with a low, fleshy, linear callus about equaling the lateral lobes in length. Column short, semi-terete, somewhat arcuate, produced at the base into a very long narrow foot.

Costa Rica and Panama.

COLÓN: summit of Cerro Santa Rita, 1200 ft., *Allen & Fairchild 5198*.

All the plants seen of this curious species have had the leaves consistently longer and narrower than in the typical Costa Rican material. The single flower of our specimen is fragmentary, and hence cannot be determined with certainty, but the plants and flowers in general aspect apparently compare better with this than with any other known species. It may be that adequate collections will prove it to be distinct.

5. *MAXILLARIA ARACHNITIFLORA* Ames & Schweinf. in Sched. Orch. 10:87. 1930.

Erect, caespitose, epiphytic herbs, up to about 38 cm. tall. Pseudobulbs complanate-cylindric, monophyllous, 4–5.5 cm. long and .5–1.0 cm. wide, the bases enveloped in several imbricating, sometimes foliaceous bracts. Leaves coriaceous, persistent, lanceolate, acute, 15–35 cm. long and 2.5–4.5 cm. wide, contracted below into an elongate, conduplicate petiole which is apparently continuous with the apex of the narrow pseudobulb. Inflorescences few to many erect 1-flowered scapes, 7–12 cm. tall, produced from the bases of the pseudobulbs, enveloped throughout in tubular, acuminate, papery bracts. Flowers relatively large and conspicuous. Sepals free, subequal, spreading, greenish yellow, linear-lanceolate, attenuate, 5–7.5 cm. long and .5–.6 cm. wide, the oblique bases of the laterals adnate to the column foot, forming a conspicuous acute mentum. Petals subequal to the sepals, white, erect with incurving apices, linear-lanceolate, long-acuminate, 5–6 cm. long and .4–.5 cm. wide. Lip concave, slightly arcuate, nearly entire but obscurely 3-lobed near the apex, clear yellow, oblong-ovate when spread out, 1.5–2 cm. long and .9–1.1 cm. wide, the base articulated with the foot of the column, the lateral margins erect, the apices bluntly acute, the obtuse mid-lobe somewhat thickened, with a fleshy callus on the under-side of the apex; disk with a fairly prominent, fleshy, slightly concave, linguiform callus about half the length of the lateral margins. Column short, stout, semi-terete, 6–7 mm. long, produced at the base into a very conspicuous foot which is about twice the length of the upper column.

Costa Rica and Panama.

COCLÉ: vic. El Valle de Antón, 600–1000 m., *Allen 1250*; trail to Las Minas, region north of El Valle, 1000 m., *Allen 2875*.

6. *MAXILLARIA BIOLLEYI* (Schltr.) L. Wms. in Ann. Mo. Bot. Gard. 28:425. 1941.

Ornithidium Biolleyi Schltr. in Fedde Rep. Sp. Nov. 9:29. 1910.

Camariidum Biolleyi Schltr. in Beih. Bot. Centralbl. 36²:498. 1918.

Erect epiphytic herbs, 30–50 cm. tall, the stout complanate-cylindric canes enveloped below in the broad persistent leaf bases, the base of the cane often with one or more oblong-elliptic, compressed pseudobulbs, 2.5–3 cm. long and 1.5–2 cm. wide. Leaves coriaceous, spreading, 2-ranked and equidistantly distributed on the upper stem, the blades ligular, shallowly and unequally 2-lobed to acute, 7–27 cm. long and 1.5–3.5 cm. wide, the conduplicate bases closely imbricating. Inflorescences slender 1-flowered scapes, 6–9 cm. long, produced in dense fascicles from the leaf axils. Flowers small. Sepals subequal, free, spreading, white, lanceolate, acuminate, 10–12 mm. long and 3.5–4 mm. wide, the laterals somewhat obliquely inserted. Petals subequal to the sepals, rather obliquely lanceolate, acuminate, white, 9–10 mm. long and 2–3 mm. wide. Lip 3-lobed, shortly clawed at the base, red, 5–6 mm. long, the lateral lobes auriculate and erect, the mid-lobe spreading, oblong-elliptic, obtuse, about $\frac{2}{3}$ the length of the lip; disk between the lateral lobes with a broadly obtuse, reniform, fleshy callus. Column short, stout, semi-terete, 2–2.5 mm. long, produced at the base into a very short foot.

Costa Rica and Panama.

CHIRIQUÍ: Bajo Chorro, in rain forest, 6000 ft., *Davidson 125*.

7. *MAXILLARIA BRACHYBULBON* Schltr. in Fedde Rep. Sp. Nov. Beih. 19:55. 1923.

Dwarf, caespitose, epiphytic herbs, 3.5–8 cm. tall, usually without pseudobulbs. Leaves coriaceous, ligular to oblanceolate, obtuse, 2–4.5 cm. long and .3–.8 cm. wide, contracted below into elongate, conduplicate petioles, the bases of which are imbricating and more or less 2-ranked. Inflorescences short, usually solitary, 1-flowered scapes produced from the base of the leaves. Flowers small, but relatively large in relation to the size of the plants. Sepals subequal, free, yellow, lanceolate, acute, 12–15 mm. long and 3–4 mm. wide, the laterals obliquely inserted on the column foot, forming a short subacute mentum. Petals subequal to the dorsal sepal, lanceolate, acuminate, yellow, 10–12 mm. long and 2–2.5 mm. wide. Lip 3-lobed near the apex, red-brown, contracted below and articulated with the column foot, the lateral margins erect, the apices acute, mid-lobe fleshy, ligular, acute, minutely papillose, about $\frac{1}{3}$ the total length of the lip. Column short, semi-terete, somewhat arcuate, about 5 mm. long, the base produced into a short foot.

Honduras, Costa Rica, and Panama.

PANAMÁ: Cerro Campana, 1000 m., *Allen 4026*.

8. *MAXILLARIA BRADEORUM* (Schltr.) L. Wms. in Ann. Mo. Bot. Gard. 28:425. 1941.

Camaridium grandiflorum Ames, in Proc. Biol. Soc. Wash. 34:149. 1921.

Camaridium Bradeorum Schltr. in Fedde Rep. Sp. Nov. Beih. 19:141. 1923.

Maxillaria ampliflora C. Schweinf. in Bot. Mus. Leaflet. Harv. Univ. 8:188. 1940.

Erect or pendulous, epiphytic herbs, 45–75 cm. tall, with elongate, cylindric canes, the lower portion usually with inconspicuous, distant, complanate-elliptic pseudobulbs, the internodes naked or enveloped in the persistent, imbricating leaf bases, the upper stem without pseudobulbs and with 2-ranked foliage. Leaves coriaceous, ligular-lanceolate, acute, 12–27 cm. long and 2–3.5 cm. wide; the conduplicate petioles imbricating and 2-ranked on the stem. Inflorescences erect 1-flowered scapes 6.5–8 cm. tall, enveloped in several tubular, papery, acuminate bracts. Flowers relatively large and conspicuous. Sepals free, spreading, subequal, the apices recurved, white with a central rose-red blotch, to wine-red with yellowish margins, lanceolate, acuminate to long-acuminate, 3–5 cm. long and 1.0–1.2 cm. wide, the dorsal sepal with a keel, the laterals inserted on the very short column foot barely forming an obscure mentum. Petals subequal to the sepals and similarly colored, lanceolate, acuminate to long-acuminate, 2.5–4 cm. long and 7–8 mm. wide. Lip very short, 3-lobed, rich orange, 8–10 mm. long and 12–14 mm. wide when spread out, abruptly contracted at the base into a short claw which is articulated with the foot of the column, the subfalcate, acute, lateral lobes erect, the obtuse, concave mid-lobe about $\frac{2}{3}$ the total length of the lip, the lateral margins lightly incurving; the disk with a truncate, sulcate or obscurely 3-lobed fleshy callus which about equals the lateral lobes in length. Column short, semi-terete, 6–8 mm. long, the base with a very short foot.

Costa Rica and Panama.

COCLÉ: summit of Cerro Pajita, hills north of El Valle de Antón, 1200 m., *Allen & Fairchild* 3942. CHIRIQUÍ: humid forest of the cordillera east of the Rio Caldera, 2000 m., *Killip* 3565; vic. Bajo Chorro, 6000 ft., *Davidson* 118.

The species is somewhat variable in regard to the presence or absence of pseudobulbs and in the size and color of the flowers.

9. *MAXILLARIA BREVIPES* Schltr. in Fedde Rep. Sp. Nov. Beih. 19:302. 1923.

Dwarf, erect, epiphytic herbs up to about 8 cm. tall. Pseudobulbs clustered, ovoid-complanate, 8–10 mm. tall and 6–8 mm. wide, the bases enveloped in several imbricating papery bracts, the apices monophyllous. Leaves coriaceous, elliptic-lanceolate, acute, 4–6.5 cm. long and .8–1.2 cm. wide, contracted below into slender, elongate, conduplicate petioles. Inflorescences usually solitary 1-flowered scapes, 2–2.5 cm. tall, produced from the base of the pseudobulbs. Flowers relatively small. Sepals subequal, free, apparently not spreading, white, ovate-lanceolate, acute to subacute, 10–13 mm. long and 3–4 mm. wide, the oblique bases of the laterals adnate to the column foot, forming a short, acute

Fig. 179. *Maxillaria Cemaridii*

mentum. Petals subequal to the dorsal sepal, somewhat obliquely lanceolate, acute, white, 10–11 mm. long and 2.5–3.5 mm. wide. Lip concave, elliptic-obovate, subacute when spread out, reddish brown, obscurely 3-lobed near the apex, 8–10 mm. long and 4–5 mm. wide, the cuneate base articulated with the foot of the column, the lateral margins erect, the apices rounded, the mid-lobe creamy yellow, obtuse, about $\frac{1}{3}$ the total length of the lip; disk with a linear, obtuse, yellow callus about equaling the lateral margins in length. Column short, stout, semiterete, produced at the base into a long narrow foot.

Costa Rica and Panama.

COCLÉ: north rim of El Valle de Antón, near Cerro Turega, 650–700 m., Woodson & Schery 201a; mountains beyond La Pintada, 400–600 m., Hunter & Allen 559; mossy forest on crest of Cerro Pajita, hills north of El Valle de Antón, 1200 m., Allen & Allen 4172.

Possibly a dwarf form of *Maxillaria Reichenheimiana*.

10. MAXILLARIA CAMARIDII Rchb. f. in Hamb. Gartenzeit. 19:547. 1863.

Camaridium ochroleucum Lindl. in Bot. Reg. 10: t. 844. 1824, non *Maxillaria ochroleuca* Lodd. ex Lindl.

Cymbidium ochroleucum Lindl., Gen. & Spec. Orch. Pl. 168. 1833.

Ornithidium album Hook. in Bot. Mag. t. 3306. 1834, non *Maxillaria alba* (Hook.) Lindl.

Camaridium affine Schltr. in Fedde Rep. Sp. Nov. Beih. 17:72. 1922.

Epiphytic herbs with elongate, complanate-cylindric, pendulous stems, the lower portions with more or less approximate, elliptic, ancipitous, diphyllous pseudobulbs 3–7 cm. long and 1.5–3 cm. wide inserted at an acute angle, those toward the apex produced at more distant intervals; the internodes and the bases of the pseudobulbs enveloped in the persistent, chartaceous, brown, imbricating bases of the obtuse, foliaceous bracts. Leaves subcoriaceous, linear-lanceolate, obtuse, retuse, or unequally 2-lobed at the apex, 15–30 cm. long and 12–18 mm. wide, the conduplicate bases contracted into very short petioles. Inflorescences short 1-flowered scapes 4–5 cm. long, usually produced in successive pairs from the bract axils of the flush of new growth, each plant thus flowering 3 or 4 times during a given season. Flowers very fragrant, relatively large and conspicuous. Sepals subequal, free, widely spreading, somewhat concave, pure white, elliptic-oblancheolate, acute, 2.5–3.5 cm. long and 1.0–1.4 cm. wide, the laterals adnate at the base to the short column foot, forming an inconspicuous rounded mentum. Petals subequal to the sepals, widely spreading, somewhat concave, pure white, elliptic-oblancheolate, acute, 2.2–3 cm. long and 9–10 mm. wide. Lip white on the outer surface, rich yellow within, with reddish brown or reddish purple transverse lines, conspicuously 3-lobed, 10–12 mm. long and 10–12 mm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes erect, rounded, the anterior margins obtuse to acute, the mid-lobe acute to suborbicular, more or less canaliculate to spreading, $\frac{2}{3}$ to $\frac{1}{2}$ the total length of the lip; disk with a linear-lanceolate, concave, yellow callus, $\frac{2}{3}$ to $\frac{3}{4}$ the length of the lateral lobes, the obscurely tridentate apex of which is fleshy and glabrous,

the basal $\frac{3}{4}$ densely and conspicuously papillose. Column semi-terete, somewhat arcuate, 6–8 mm. long, pure white, with a reddish brown or deep purple blotch at the base.

Guatemala, Costa Rica, Panama, Trinidad, British Guiana, Surinam, and probably other adjacent territory.

CANAL ZONE: Río Pedro Miguel, near Paraiso, *Standley 29988*. PANAMÁ: hills east of Panama City, sea level, *Powell 7*; Río Tecúmen, *Standley 29413*; Juan Díaz, sea level, *Cope s. n.*; Cerro Campana, vic. Campana, 2000 ft., *D. Allen 5087*; San José Island, Perlas Archipelago, *Harlow 58*, *Johnston 206*, *1403*. COCLÉ: hills south of El Valle de Antón, 800 m., *Allen 2667*.

A common and attractive species, widely distributed throughout the lowlands of our area. The flowers are produced usually in pairs in several successive flowerings lasting but a single day in each instance. The fragrance is reminiscent of that of *Narcissus*.

11. *MAXILLARIA CHARTACIFOLIA* Ames & Schweinf. in Sched. Orch. 10:92. 1930.

Erect, epiphytic herbs without pseudobulbs, the foliage distichously arranged in the form of a fan. Leaves subcoriaceous, linear-lanceolate, acuminate, 8–30 cm. long and 1.0–2.2 cm. wide, the broad, conduplicate, chartaceous bases closely imbricating and persistent. Inflorescences usually about 1–3, slender, 1-flowered scapes 6–9 cm. tall, enveloped in several papery, tubular, acuminate bracts. Flowers relatively small, dull purplish red or reddish brown. Sepals subequal, free, spreading, elliptic-lanceolate, acute, 14–18 mm. long and 5.5–7.3 mm. wide, the laterals somewhat obliquely inserted on the short column foot, forming an inconspicuous, rounded mentum. Petals subequal to the dorsal sepal, elliptic-oblancoolate, acute, 10–13 mm. long and 3.5–5 mm. wide. Lip entire or very obscurely 3-lobed, oblong-ovate, obtuse or subacute, 10–14 mm. long and 2.5–3.5 mm. wide, contracted at the base and articulated with the short column foot, the lateral margins somewhat involute, the apical lobe ovate to oblong-ovate, obtuse to subacute, spreading. Column semi-terete, somewhat arcuate, 6–7.5 mm. long, produced at the base into a short foot.

Costa Rica and Panama.

COCLÉ: vic. El Valle de Antón, 600–1000 m., *Allen 1256*, *2074*, *4450*.

A curious species, unlike most other *Maxillarias*, the plants somewhat reminiscent of a *Chondrorhyncha*. The last two collections cited have shorter and narrower leaves and somewhat smaller flowers than those of the type, but otherwise appear to be more nearly referable to this species than to any other.

12. *MAXILLARIA CONDUPLICATA* (A. & S.) L. Wms. in Ann. Mo. Bot. Gard. 29:348. 1942.

Ornithidium conduplicatum Ames & Schweinf. in Sched. Orch. 8:66, t. 5. 1925.

Stout, erect, epiphytic herbs with cylindric, ascending stems apparently often branching and enveloped in 2-ranked foliage; the base of the cane with one or

more stout, ovoid, monophyllous pseudobulbs, in our specimen 5.5 cm. tall and



Fig. 180. *Maxillaria conduplicata*

3.5 cm. wide. Mature leaves absent in our specimen, but apparently large, numerous and ligular, the upper stem covered by the broad, coarse, complanate, 2-ranked, imbricating, persistent bases. Inflorescences short 1-flowered scapes about 2.5 cm. long, produced in dense fascicles from the leaf axils. Flowers small. Sepals subequal, free, apparently not spreading, elliptic-lanceolate, acute, about 6 mm. long and 2–2.5 mm. wide, the laterals somewhat oblique and concave at the base. Petals subequal to the dorsal sepal, elliptic-obovate, acute, about 5 mm. long and 2 mm. wide. Lip canalliculate, with a deep median constriction, more or less subquadrate and 4-lobed when spread out, about 4 mm.

long and 2.6 mm. wide, the narrowed base adnate to the base of the column, the lateral lobes rounded, erect in natural position, the mid-lobe suborbicular, conspicuously emarginate at the apex, the lateral concave, rounded lobules erect, the median constriction with a transverse, fleshy callus. Column very short, stout, about 1.75 mm. long.

Panama.

CHIRIQUÍ: Palo Alto Hill, 4000–5000 ft., Powell 341.

Known only from the type collection.

13. *MAXILLARIA CONFUSA* Ames & Schweinf. in Sched. Orch. 8:57. 1925.

Small, erect, epiphytic herbs up to about 25 cm. tall, with clustered, elliptic-oblong, compressed, monophyllous pseudobulbs 12–18 mm. tall and 8–12 mm. wide, the bases enveloped in several imbricating bracts, the upper pair of which is usually foliaceous. Leaves coriaceous, grayish green, ligular to elliptic-lanceolate, acute, 7–16 cm. long and 2–3.5 cm. wide, contracted below into elongate, slender, conduplicate petioles. Inflorescences usually 6–8 slender, 1-flowered scapes 3–4 cm. long, produced from the base of the pseudobulbs. Flowers of moderate size, but large in relation to the size of the plants. Sepals subequal, free, spreading, white, linear-lanceolate, abruptly acute, 17–20 mm. long and 4–5 mm. wide, the oblique bases of the laterals inserted on the elongate column foot, forming a conspicuous acuminate mentum. Petals subequal to the dorsal sepal, white, from an oblique base lanceolate-acuminate, 15–17 mm. long and 4–5 mm. wide. Lip canalliculate, reddish brown, obscurely 3-lobed near the apex, oblong-

obovate, about 12 mm. long and 6 mm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral margins erect, the apices rounded, mid-lobe ovate, acute, about $\frac{1}{4}$ the total length of the lip, conspicuously thickened and with a tubercle on the under-surface of the apex; disk with a fleshy linguiform callus, about $\frac{2}{3}$ the length of the lateral margins. Column short, stout, semi-terete, somewhat arcuate, produced at the base into a long narrow foot.

Costa Rica and Panama.

VERAGUAS: forested slopes of Cerro Tuté, region west of Santa Fé, 2500 ft., Allen & Fairchild 4405.

It seems quite possible that this species, as well as *Maxillaria brevipes* and *M. arachnitiflora*, may prove to be but well-marked varieties of *Maxillaria Reichenheimiana*.

14. *MAXILLARIA CRASSIFOLIA* (Lindl.) Rchb. f. in Bonplandia 2:16. 1854.

Epidendrum sessile Swartz, Prodr. Veg. Ind. Occ. 122. 1788, non *Maxillaria sessilis* Lindl.

Heterotaxis crassifolia Lindl. in Bot. Reg. 12: t. 1028. 1826.

Dicrypta Baueri Lindl. Gen. & Spec. Orch. Pl. 44. 1830.

Dicrypta crassifolia Lindl. ex Loud. Hort. Brit. Suppl. 3:536. 1839.

Maxillaria sessilis Fawcett & Rendle, Fl. Jam. 1:120. 1910, non Lindley.

Maxillaria gatunensis Schltr. in Fedde Rep. Sp. Nov. Beih. 17:68. 1922.

Erect, caespitose, epiphytic herbs averaging about 30 cm. tall. Leaves fleshy, linear-lanceolate, obtuse to acute, 6-35 cm. long and 1-3.8 cm. wide, the conduplicate bases imbricating and forming a short, more or less complanate petiole, sometimes enveloping an inconspicuous, poorly developed, oblong, monophyllous pseudobulb, all but the leaf of the pseudobulb actually being foliaceous bracts. Inflorescences usually short, solitary, 1-flowered scapes, nearly sessile in the upper bract axils. Flowers of moderate size. Sepals subequal, free, spreading, usually yellow or pale yellow, lanceolate, acute, 16-20 mm. long and 5-6 mm. wide, the dorsal sepal somewhat concave, the laterals adnate to the column foot, forming a short, rounded mentum. Petals usually yellow, subequal to the dorsal sepal, linear-lanceolate to oblanceolate, acute, 14-17 mm. long and 3-4 mm. wide. Lip nearly entire or obscurely 3-lobed, yellow with red spots to dark red, concave, 12-14 mm. long and 5-7 mm. wide when spread out, contracted at the base and articulated with the column foot, lateral margins erect, the mid-lobe about $\frac{1}{3}$ to $\frac{1}{2}$ the total length of the lip, somewhat thickened and minutely papillose; the disk with a fleshy, thickened keel. Column elongate, semi-terete, somewhat arcuate, 7-9 mm. long, produced at the base into a short foot.

Mexico, Guatemala, British Honduras, Honduras, Costa Rica, Panama, Colombia, Venezuela, Brazil, Florida, Cuba, Jamaica, Hispaniola and probably other adjacent areas.

CANAL ZONE: Gatún Lake, sea level, Powell 207. PANAMÁ: San José Island, Perlas Archipelago, Johnston 273, 1275-A. CHIRIQUÍ: without definite locality, 4000 ft., Powell

118. BOCAS DEL TORO: without definite locality, *von Wedel* 477. DARIÉN: vic. Pinogana, Río Tuira, 20 m., *Allen* 917.

A very common, weedy species widely distributed throughout the lowlands of our area.

15. MAXILLARIA CTENOSTACHYA Rchb. f. in Gard. Chron. 39. 1870.

Maxillaria ctenostachys Rchb. f. ex Schltr. in Beih. Bot. Centralbl. 36²:495. 1918.

Camaridium arachnites Schltr. in Fedde Rep. Sp. Nov. Beih. 17:73. 1922.

Camaridium stenostachys Schltr. loc. cit. 19:238. 1923.

Elongate, slender, erect or pendulous, epiphytic herbs. Pseudobulbs elliptic, ovoid, complanate, rugose, tapering, diphyllous, those at the base of the plant clustered, 3.5–6.5 cm. tall and 2.5–4 cm. wide, those on the upper branching stem becoming very distant and inserted at an acute angle, 2.5–5 cm. tall and 1.5–2 cm. thick, the bases provided with several elongate, foliaceous bracts; the long internodes closely enveloped in long, acuminate, persistent, papery bracts. Leaves coriaceous, linear-lanceolate, acute, 15–35 cm. long and 1–2.5 cm. wide, contracted below into short conduplicate petioles. Inflorescences usually many short, slender, 1-flowered scapes 1.5–2 cm. long, from the bract axils of the distichous flush of new growth, which at flowering time much resembles the stem of a *Lockhartia* in vegetative appearance. Flowers relatively large, most or all being produced simultaneously, the flowering habit reminiscent of that of *Maxillaria alba*. Sepals subequal, free, more or less spreading, white or pale yellow, lanceolate, long-acuminate, 2.5–4 cm. long and .4–.5 cm. wide; the laterals adnate to the column foot, forming a short, rounded mentum. Petals subequal to the sepals, white or pale yellow, rather obliquely elliptic-lanceolate, long-acuminate, 2–3 cm. long and .3–.5 cm. wide. Lip conspicuously 3-lobed, white or pale yellow, the inner surface with brown or tan markings, 8–12 mm. long and 6–8 mm. wide when spread out, contracted at the base and articulated with the foot of the column, lateral lobes erect in natural position, the anterior margins acute, mid-lobe ovate, acute, about $\frac{1}{2}$ the total length of the lip, the apex reflexed and somewhat thickened; disk with 5 erect, parallel keels, about $\frac{3}{4}$ the length of the lateral lobes, the central 3 of which are rounded at the apex and conspicuously thickened. Column semi-terete, somewhat arcuate, 4–6 mm. long, produced at the base into a short foot.

Costa Rica and Panama.

CHIRIQUÍ: Río Caldera, 4500 ft., *Powell* 210.

16. MAXILLARIA CUCULLATA Lindl. in Bot. Reg. 26: t. 12. 1840.

Maxillaria meleagris Lindl. loc. cit. 30: Misc. 3. 1844.

Maxillaria Lindeniana Rich. & Gal. in Ann. Sci. Nat. Bot. III, 3:24. 1845.

Maxillaria obscura Linden & Rchb. f. in Rchb. Beitr. Orch. Centr.-Amer. 31. 1866.

Maxillaria puncto-striata Rchb. f. in Linnaea 41:28. 1877.

Erect, epiphytic herbs with clustered, oblong-ovoid to elliptic-ovoid, compressed, rugose, monophyllous pseudobulbs 2.5–4 cm. tall and 1.5–2.5 cm. wide, the bases enveloped in several imbricating, papery bracts. Leaves coriaceous, acute, or retuse and obscurely 2-lobed at the apex, 15–30 cm. long and 1.5–2 cm. wide, contracted below into a conduplicate petiole. Inflorescences usually 3–4 short to elongate, 1-flowered scapes from the base of the pseudobulbs, enveloped in numerous, often spreading, conspicuous, tubular, papery, acuminate bracts. Flowers of moderate size, dark reddish or purplish brown with a maroon lip, or with yellow sepals and petals which may be marked with varying amounts of the darker color. Sepals free, subequal, spreading, lanceolate to elliptic-lanceolate, acute, 1.8–2.2 cm. long and .4–.6 cm. wide, the laterals adnate to the foot of the column, forming a short, subacute mentum. Petals lanceolate, acute, 1.5–1.8 cm. long and .4–.6 cm. wide. Lip conspicuously 3-lobed, 1.4–1.6 cm. long and .6–.8 cm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes short, conspicuously erect in natural position, the mid-lobe elliptic-lanceolate to elliptic-ovate, acute to subacute, about $\frac{2}{3}$ the total length of the lip, the apex thickened, with a fleshy keel on the under-surface; disk with a broad, obtuse, fleshy callus about equaling the lateral lobes in length. Column short, stout, somewhat arcuate, rather dilated at the apex, produced at the base into a foot.

Mexico, Guatemala, Nicaragua, Costa Rica, Panama, and probably adjacent territories.

CHIRIQUÍ: Bajo Chorro, in rain forest, 6000 ft., *Davidson 115*; in woods on Llano del Volcán, 1500 m., *Allen 3504*.

17. *MAXILLARIA DENDROBIOIDES* (Schltr.) L. Wms. in Ann. Mo. Bot. Gard. 27:283. 1940.

Camaridium dendrobioides Schltr. in Beih. Bot. Centralbl. 36²:415. 1918.

Camaridium Jimenezii Schltr. loc. cit. 416. 1918.

Camaridium simile Schltr. in Fedde Rep. Sp. Nov. Beih. 19:239. 1923.

Slender, erect or pendulous, epiphytic herbs without pseudobulbs, 30–45 cm. tall, the stems usually branching, the lower portions enveloped in the closely imbricating, papery leaf bases; the foliage of the apex 2-ranked. Leaves spreading, coriaceous, ligular, the apices usually retuse or rather unequally 2-lobed, very variable in size, 1–6 cm. long and .25–1.0 cm. wide (in our specimens 1.5–2 cm. long and about .3 cm. wide), the conduplicate bases closely imbricating and persistent, enveloping the stems. Inflorescences short, slender, 1-flowered scapes 10–15 mm. long, produced from the leaf axils. Flowers small. Sepals free, subequal, apparently not spreading, lanceolate, acute or obtuse, 9–11 mm. long and 2–2.5 mm. wide, the laterals somewhat obliquely inserted on the column foot, forming a short, rounded mentum. Petals subequal to the dorsal sepal, rather obliquely elliptic-oblancoate, obtuse or shortly acute, 7–8.5 mm. long and 2–2.5 mm. wide. Lip obscurely 3-lobed, about 7.5 mm. long and 3.5 mm. wide when

spread out, contracted at the base and articulated with the column foot, the lateral lobules or margins rounded, erect in natural position, the mid-lobe ovate to ligular, obtuse, about $\frac{1}{2}$ the total length of the lip; disk with 3 parallel, thickened nerves, about $\frac{1}{2}$ the length of the lateral margins. Column semi-terete, about 3.5 mm. long, produced at the base into a short foot.

Costa Rica and Panama.

CHIRIQUÍ: vic. Bajo Chorro, in heavy rain forest, 6000 ft., *Davidson 240*.

18. *MAXILLARIA DIUTURNA* Ames & Schweinf. in Sched. Orch. 8:58. 1925.

Erect or pendent, epiphytic herbs with elliptic-oblong to elliptic-ovate, strongly ancipitous, monophyllous pseudobulbs 2–3 cm. long and .1–.2 cm. wide, rather distant and inserted at an acute angle on the stems; the internodes and bases of the pseudobulbs enveloped in closely imbricating, persistent bracts the upper pair of which is foliaceous. Leaves persistent, coriaceous, ligular to elliptic-lanceolate, acute or minutely and unequally 2-lobed, 6–15 cm. long and 1.2–3 cm. wide, contracted below into short, conduplicate petioles. Inflorescences short, slender, 1-flowered scapes, apparently produced singly in succession from the bract axils of the flush of new growth. Flowers pseudo-campanulate, of moderate size. Sepals subequal, free, not spreading, bright yellow or sometimes reddish yellow on the outer surfaces, 12–14 mm. long and 5–6 mm. wide, ovate-lanceolate, acute, concave, with a low central keel, the laterals adnate to the column foot forming a prominent, rounded mentum. Petals elliptic-ovate, acute, bright yellow, 10–12 mm. long and 6–7 mm. wide. Lip entire, bright yellow with scarlet markings, oblong-pandurate, 10–12 mm. long and 5–6 mm. wide when spread out, somewhat contracted at the base and articulated with the column foot, lateral margins somewhat erect in natural position, the apex truncate, obscurely emarginate and 2-lobed, the lobules somewhat erect in natural position; the disk with a linear to oblong, obtuse, fleshy callus. Column semi-terete, somewhat arcuate, 5–6 mm. long, produced at the base into a foot.

Costa Rica and Panama.

PANAMÁ: cloud forest on the summit of Cerro Campana, 3000 ft., *Allen 5183*. COLÓN: Cativo-Porto Bello trail, sea level, *Powell 376*. COCLÉ: vic. La Mesa, region north of El Valle de Antón, 1000 m., *Allen 2306, 2935*.

19. *MAXILLARIA EXALTATA* (Kränzl.) C. Schweinf. in Bot. Mus. Leaf. Harv. Univ. 11:272. 1945.

Camaridium exaltatum Kränzl. in Engler's Bot. Jahrb. 37:386. 1906.

Tall, erect, epiphytic herbs, the cylindric, sometimes branching stems 60–75 cm. tall, apparently entirely without pseudobulbs, the lower portions enveloped in the closely imbricating, persistent, chartaceous leaf bases which ultimately weather to loose fibers, the upper stem with 2-ranked foliage. Leaves coriaceous, linear-lanceolate, acuminate, 9–25 cm. long and .8–1.5 cm. wide, the broad, conduplicate bases imbricating and equidistantly distributed on the stem. Inflores-

cences usually several, slender, 1-flowered scapes 5–6 cm. long, produced from the upper leaf axils. Flowers of moderate size. Sepals free, subequal, spreading, pale pinkish tan (in our specimens), the dorsal sepal linear-lanceolate, acute, with a central keel, 2–2.5 cm. long and .35–.5 cm. wide, the laterals ligular, acute, 2.3–2.8 cm. long and .5–.7 cm. wide, the bases rather oblique and adnate to the column foot, forming a prominent acute mentum. Petals linear-lanceolate, acute, pale pinkish tan (in our specimens), 2–2.2 cm. long and .3–.4 cm. wide. Lip 3-lobed near the apex, reddish-brown, 13–15 mm. long and 6–8 mm. wide when spread out, contracted at the base and articulated with the column foot, lateral lobes erect in natural position, the anterior margins subacute and somewhat projecting, the mid-lobe ovate, abruptly acute, about $\frac{1}{4}$ the total length of the lip, conspicuously thickened and minutely papillose, with a prominent tubercle on the underside of the apex; the disk with a ligular, rather concave, obtuse callus, about $\frac{3}{4}$ the length of the lateral lobes, the apex rather conspicuously thickened. Column short, stout, semi-terete, produced at the base into a long foot.

Panama and Peru.

COCLÉ: mossy forest on the crest of Cerro Pajita, hills north of El Valle de Antón, 1200 m., Allen & Fairchild 3945.

This collection represents a tremendous extension of range for this rather poorly known Peruvian species. Our specimens match the excellent photograph of the type and the type description in the Ames Herbarium almost exactly, even to the size of the floral parts, which is remarkable in view of the wide separation of the areas of collection. It is of course to be expected that the species also exists in Colombia and Ecuador, and will eventually be collected there.

20. *MAXILLARIA FRIEDRICHSTHALII* Rchb. f. in Bot. Zeit. 10:858. 1852.

Maxillaria aciantba Rchb. f. loc. cit. 1852.

Lycaste aciantba Rchb. f. in Bonplandia 3:216. 1855.

Maxillaria turialbae Schltr. in Beih. Bot. Centralbl. 36²:414. 1918.

Maxillaria rhodosticta Kränzl. in Fedde Rep. Sp. Nov. 24:223. 1928.

Erect or semi-pendent, epiphytic herbs with complanate, elliptic-oblong, rugose pseudobulbs 1.5–5 cm. tall and 7–15 mm. wide, approximate and inserted at an acute angle on the usually arching rhizome; the short internodes and bases of the pseudobulbs enveloped in the persistent, chartaceous bases of the closely imbricating bracts, the upper pair of which is usually foliaceous. Leaves coriaceous, 2–3 (very rarely 1 or 4) from the apex of the pseudobulbs, ligular, the apex obscurely and unequally 2-lobed, 3.5–18 cm. long and .7–1.5 cm. wide, contracted below into very short, conduplicate petioles. Inflorescences 1 to several, often loosely fasciculate, 1-flowered scapes 1.8–4 cm. long, produced from the base of the mature pseudobulb, the peduncles closely enveloped in numerous broad, acute, imbricating, chartaceous bracts. Flowers small to relatively large, the size apparently correlated with the size of the plant. Sepals subequal, free, not spread-

ing, linear-lanceolate, acute to acuminate, 1.5–3 cm. long and .3–.6 cm. wide, greenish yellow to greenish lavender, the laterals adnate to the column foot, form-



Fig. 181. *Maxillaria Friedrichsthalii*

ing a short, acute mentum. Petals lanceolate to linear-lanceolate, acute to acuminate, greenish yellow, 1.2–2.5 cm. long and .2–.3 cm. wide. Lip entire, linear-oblongate, obtuse to subacute, canaliculate, 1.2–2.5 cm. long and .3–.6 cm. wide, usually pale yellowish green, the long narrow base articulated with the foot of the column, the lateral margins somewhat erect, the apex conspicuously thickened, usually dark maroon to nearly black; the disk with a rather obscure, yellow central keel, which extends from the base about $\frac{2}{5}$ the total length of the lip. Column elongate, semi-terete, somewhat arcuate, 8–20 mm. long, produced at the base into a short foot.

Mexico, British Honduras, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, and probably adjacent South America.

CANAL ZONE: Barro Colorado Island, *Shattuck 543*. PANAMÁ: vic. Paja, sea level, *Powell 3210*; Cerro Campana, vic. Campana, 800 m., *Allen 4025*. COCLÉ: vic. El Valle de Antón, 600–1100 m., *Allen 1254, 1257, 3992*; Bismarck, 2000–3000 ft., *Williams 444*. CHIRIQUÍ: without definite locality, 4000–5000 ft., *Powell 3516*; Bajo Mono, 4500 ft., *Davidson 524*.

A very common species, widely distributed throughout the lowlands and intermediate highlands of our area.

21. *MAXILLARIA FULGENS* (Rchb. f.) L. Wms. in Ann. Mo. Bot. Gard. 28:425. 1941.

Ornithidium fulgens Rchb. f. Beitr. Orch. Centr.-Amer. 76. 1866.

Erect, epiphytic herbs 40–75 cm. tall, with elongate, often branching, cylindrical, woody canes usually arising from a basal cluster of a few stout, ovoid, fleshy pseudobulbs 3.5–4 cm. tall and 2–3 cm. wide; the long internodes or basal portions of the stems closely enveloped in the persistent, imbricating leaf bases, or becoming naked after these have weathered away; the apex of the cane with 2-ranked foliage. Leaves coriaceous, linear-lanceolate, acute, 12–38 cm. long and 1.5–3 cm. wide, forming a compact, distichous fascicle at the apex of the stems, portions of which are often still in evidence at the earlier nodes along the more elongate canes, the conduplicate leaf bases sometimes enveloping a small, poorly developed pseudobulb. Inflorescences usually about 15–30 slender, 1-flowered scapes, 1.5–3 cm. tall, in dense subsessile fascicles from the lower leaf axils. Sepals rather fleshy, subequal, free, not spreading, broadly ovate, acute, concave, reddish orange, 7–8 mm. long and 3–3.5 mm. wide, the laterals adnate to the somewhat produced base of the column, forming a short, rounded mentum. Petals lanceolate, acute, 5–6 mm. long and about 2.5 mm. wide, suffused reddish orange shading to yellow at the base. Lip entire, bright yellow or orange, 4–4.5 mm. long and 1.5–2 mm. wide, geniculate and more or less sigmoid in profile, the orbicular basal half deeply concave or subsaccate, adnate to the base of the column, the strongly reflexed apical half elliptic-oblong, obtuse, rather fleshy, with thin, erect, often somewhat undulant margins, the apex becoming rather shallowly emarginate, with a short, acute, fleshy, carinate projection on the under-surface. Column semiterete, somewhat arcuate, bright yellow, 2.5–3 mm. long, the base without a foot.

Costa Rica and Panama.

COCLÉ: region north of El Valle de Antón, vic. La Mesa and La Loma del Tigre, about 3000 ft., *Allen 2256, 2388, 3779*. CHIRIQUÍ: Caramilla, 5000 ft., *Powell 283*.

A frequent, attractive species of the wet highland forests of Coclé and Chiriquí provinces.

22. *MAXILLARIA INAUDITA* Rchb. f. Beitr. Orch. Centr.-Amer. 76. 1866.

Robust, erect or pendulous, epiphytic herbs 45–60 cm. tall, the elongate

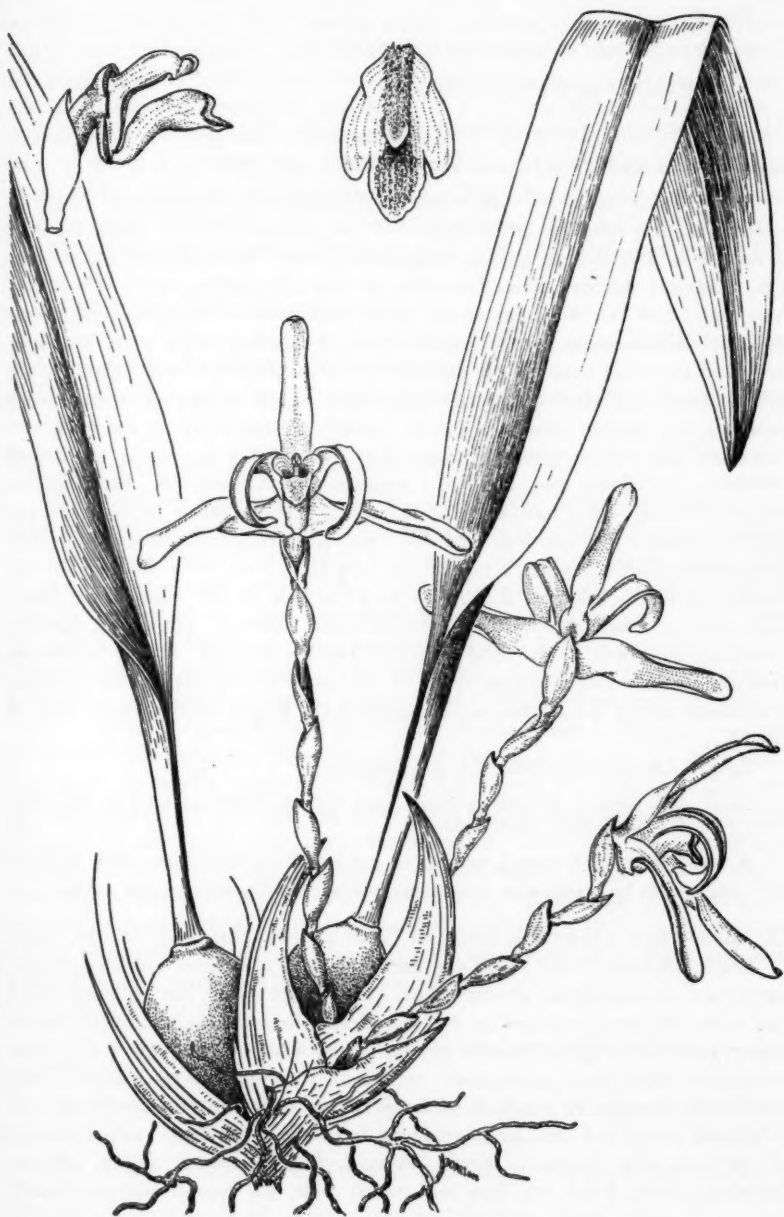
cylindric canes provided with distichous, spreading foliage at the apex, the basal portions enveloped in the broad, complanate, persistent, imbricating leaf bases; the plants seemingly without pseudobulbs but sometimes with 1 or more elliptic-oblong, strongly ancipitous, monophyllous pseudobulbs up to 8 cm. tall and 4.5 cm. wide at the base of the leafy cane. Leaves coriaceous, ligular to elliptic-lanceolate, broadly obtuse, 15–25 cm. long and 3.5–4.5 cm. wide, contracted at the base into narrow conduplicate petioles, the broader rugose bases persistent and equidistantly distributed on the stems. Inflorescences short 1-flowered scapes 4–5 cm. long, produced from the axils of the leaves. Flowers relatively large and conspicuous. Sepals subequal, free, spreading, lanceolate, acuminate, white, 2.5–4 cm. long and 6–8 mm. wide, the laterals adnate to the column foot, forming an inconspicuous, rounded mentum. Petals lanceolate, acuminate, white, 2.2–3 cm. long and .4–.5 cm. wide. Lip rather obscurely 3-lobed, ovate, obtuse to subacute when spread out, 1.5 cm. long and 1 cm. wide, contracted at the base into a short claw which is articulated with the foot of the column, the lateral lobes white, erect in natural position, the mid-lobe ovate, obtuse to subacute, yellow, about $\frac{1}{3}$ the total length of the lip, separated from the lateral lobes by plicate folds; the disk with a concave, ligular, obtuse callus which is about $\frac{3}{4}$ the length of the lateral lobes. Column semi-terete, somewhat arcuate, 6–8 mm. long, produced at the base into a short foot.

Costa Rica and Panama.

VERAGUAS: forested slopes of Cerro Tuté, region west of Santa Fé, 3000 ft., *Allen & Fairchild 4338*.

23. *MAXILLARIA LONGIPETIOLATA* Ames & Schweinf. in Sched. Orch. 8:61. 1925.

Erect, epiphytic herbs about 23 cm. tall, with elliptic-ovoid, compressed, somewhat finely wrinkled monophyllous pseudobulbs 2.5 cm. tall and 1.5 cm. wide, which apparently are approximate on an abbreviated rhizome, the bases enveloped in several papery bracts which become fibrous with age. Leaves subcoriaceous, linear-lanceolate, acuminate, 16 cm. long and 2 cm. wide, contracted below into an elongate, slender, conduplicate petiole. Inflorescences apparently short, solitary, 1-flowered scapes from the base of the pseudobulbs. Flowers of moderate size. Sepals subequal, free, spreading, oblong-lanceolate, acute, Indian red, 16–18 mm. long and 5.5–5.8 mm. wide. Petals subequal to the dorsal sepal, Indian red, linear-lanceolate, rather obliquely acute, 1.5–2.5 cm. long and about 3 mm. wide. Lip conspicuously 3-lobed, dark maroon, about 1.4 cm. long and .8 cm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes erect in natural position, the acute apices spreading, the mid-lobe ligular, about $\frac{1}{2}$ the total length of the lip, the rounded apex lightly retuse; the disk with a linear-lanceolate callus about $\frac{2}{3}$ the length of the lateral lobes, the obtuse apex rather fleshy. Column semi-terete, somewhat arcuate, about 7 mm. long, produced at the base into a short foot. Anther yellow.

Fig. 182. *Maxillaria luteo-alba*

(453)

Panama.

PANAMÁ: hills east of Corozal, sea level, *Powell* 307.

Known only from the type collection.

24. MAXILLARIA LUTEO-ALBA Lindl. Orch. Linden. 20. 1846.

Maxillaria luteo-grandiflora Hort. in Flor. Mag. 10: t. 559. 1871.

Erect, epiphytic herbs with stout, oblong-ovoid to elliptic-ovoid, somewhat compressed, monophyllous pseudobulbs 3–5 cm. tall and 2–3 cm. wide, the bases enveloped in several long, papery, imbricating bracts which become fibrous with age. Leaves coriaceous, linear-lanceolate to elliptic-lanceolate, acute, 25–50 cm. long and 2.5–4 cm. wide, contracted below into short or elongate, conduplicate petioles. Inflorescences usually about 3 erect, 1-flowered scapes 9–14 cm. long, produced from the bases of the pseudobulbs, enveloped in several papery, acute, tubular bracts. Flowers conspicuous, the largest of the genus in Panama. Sepals subequal, free, widely spreading, ligular, broadly obtuse, white on the outer surfaces and pale yellow within, 4–5 cm. long and 1.0–1.2 cm. wide, the laterals adnate to the column foot, forming a prominent, acute mentum. Petals ligular, shortly subacute, the apices incurving in natural position, white without and pale yellow within, 3.5–4 cm. long and .5–.7 cm. wide. Lip conspicuously 3-lobed, deep yellow, margined white, about 2.5 cm. long and 1.8 cm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes erect in natural position, the rounded apices somewhat projecting, mid-lobe ovate, obtuse, about $\frac{1}{3}$ the total length of the lip; the disk with a linguiform, laterally bicarinate, acute callus, about $\frac{2}{3}$ the length of the lateral lobes. Column semi-terete, somewhat arcuate, about equaling the length of the lateral lobes of the lip.

Costa Rica, Panama, Colombia, and Ecuador.

COCLÉ: hills north of El Valle de Antón, crest of Cerro Pajita and La Loma del Tigre, 3000–3200 ft., *Allen* 2870, 3817, 4192.

A common, large-flowered, attractive species of the high rainy hills north of El Valle, and to be expected in other similar situations throughout our range.

25. MAXILLARIA MALEOLENS Schltr. in Fedde Rep. Sp. Nov. Beih. 19:233. 1923.

Erect, epiphytic herbs 30–45 cm. tall, with approximate or solitary, strongly ancipitous, monophyllous, oblong-elliptic pseudobulbs 4.5–8 cm. tall and 2–3.5 cm. wide, the bases enveloped in 3–4 complanate, imbricating, foliaceous bracts. Leaves coriaceous, ligular, broadly obtuse, 15–45 cm. long and 2.5–5 cm. wide, contracted below into conduplicate petioles, the complanate-conduplicate bases distichously arranged in the form of an open fan. Inflorescences usually solitary, 1-flowered scapes 5–8 cm. long, produced from the upper bract axils. Flowers of moderate size, fragrant. Sepals subequal, free, spreading, yellow, elliptic-lanceolate, acute, 2–2.5 cm. long and .8–1.0 wide, the laterals rather obliquely

inserted on the column foot, forming a short, rounded mentum. Petals yellow, ligular, the apices obliquely acute, 18–20 mm. long and 4–5 mm. wide. Lip rather obscurely 3-lobed, reddish brown to rich purple throughout, or sometimes with the lateral lobes yellow, 2–2.3 cm. long and 1–1.2 cm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes or margins rounded, erect in natural position, the mid-lobe ovate, obtuse, rather fleshy, about $\frac{1}{3}$ the total length of the lip, reflexed at the apex; the disk with a narrow, thickened, central nerve, about equaling the lateral lobes in length. Column semi-terete, somewhat arcuate, 12–15 mm. long, produced at the base into a foot.

Honduras, Costa Rica, and Panama.

CANAL ZONE: Gatún Lake, sea level, Powell 276. COCLÉ: region north of El Valle de Antón, 3000 ft., Fairchild s. n. (under Allen 2932).

26. *MAXILLARIA MINOR* (Schltr.) L. Wms. in Amer. Orch. Soc. Bull. 10:273. 1942.

Camaridium minus Schltr. in Beih. Bot. Centralbl. 36²:417. 1918.

Erect, epiphytic herbs with slender, branching stems provided with small, very distant, suborbicular, monophyllous, compressed pseudobulbs 6–15 mm. long and 6–15 mm. wide, the bases covered by 2–3 conspicuous, foliaceous bracts, the long internodes very closely enveloped in complanate, imbricating, acuminate, papery sheaths. Leaves subcoriaceous, lanceolate to elliptic-lanceolate, acute, 3.5–15 cm. long and 1–2 cm. wide, contracted below into slender, conduplicate petioles. Inflorescences several very short, 1-flowered scapes 5–10 mm. long, apparently produced simultaneously from the bract axils of the flush of new growth. Flowers very small, often enveloped in 2 glumaceous bracts. Sepals subequal, free, not spreading, concave, oblong-lanceolate, acute to subacute, about 4 mm. long and 2 mm. wide, the laterals adnate to the base of the column, forming a rounded, conspicuous mentum. Petals subequal to the dorsal sepal, ligular, obtuse, about 3 mm. long and 1.5 mm. wide. Lip fleshy, 3-lobed, about 3 mm. long, articulated with the base of the column, the lateral lobes rounded, erect, on either side of a basal concavity which has a short, ligular, fleshy callus, the mid-lobe ovate, subacute, nearly $\frac{1}{2}$ the total length of the lip, the basal constriction below the lateral lobes with a transverse, semicircular thickening. Column short, stout, the lateral margins thickened toward the obscurely produced base.

Costa Rica and Panama.

COCLÉ: mossy forest on summit of Cerro Pajita, hills north of El Valle de Antón, 1100 m., Allen 3991.

27. *MAXILLARIA NEGLECTA* (Schltr.) L. Wms. in Ann. Mo. Bot. Gard. 29:348. 1942.

Ornithidium anceps Rchb. f. Beitr. Orch. Centr.-Amer. 75. 1866, non *Maxillaria anceps* A. & S.

Ornithidium neglectum Schltr. in Fedde Rep. Sp. Nov. Beih. 19:242. 1923.



Fig. 183. *Maxillaria neglecta*
(456)

Erect or pendulous, epiphytic herbs, of very variable vegetative habit, usually with elongate, often branching rhizomes. Pseudobulbs monophyllous, ligular to suborbicular, strongly ancipitous to very thick and fleshy, 1.5–4.5 cm. long and .5–1.5 cm. wide, approximate to very distant, inserted at an acute angle on the stems, the long cylindric internodes and the bases enveloped in closely imbricating, papery bracts. Leaves subcoriaceous, ligular, acute, 6–18 cm. long and 1.2–2.5 cm. wide, the bases contracted into very short conduplicate petioles. Inflorescences very short, 1-flowered scapes, produced in dense subsessile fascicles from the bases of the mature pseudobulbs. Flowers small, usually enveloped in 2 glumaceous bracts. Sepals free, apparently not spreading, concave, yellow or white, about 6 mm. long, the dorsal sepal elliptic-ovate, acute, the laterals broadly rhombic with oblique, acute apices, the oblique bases forming an acute or rounded, conspicuous mentum. Petals subequal to the dorsal sepal, oblong-ligular, subacute, about 4.5 mm. long, similarly colored with the sepals. Lip yellow, about 6 mm. long and 3 mm. wide when spread out, geniculate in profile, the long narrow base continuous with the base of the column, the limb dilated and conspicuously 3-lobed near the apex, the obliquely triangular lateral lobes erect, joined below the apices by a narrow transverse callus, the mid-lobe rather fleshy, triangular to broadly ovate, acute to obtuse, inserted at an abruptly deflexed angle below the apices of the lateral lobes. Column short, about 1.7 mm. long, the base continuous with the claw of the lip.

Honduras, Nicaragua, Costa Rica, and Panama.

CANAL ZONE: hills north of Frijoles, *Standley* 27669. PANAMÁ: hills east of Panama City, sea level, *Powell* 324. COLÓN: Río Pequeni, upper Madden Lake region, 200 ft., *Fairchild* s. n.; Cerro Santa Rita, 1200 ft., *Allen & Fairchild* 5191. COCLÉ: vic. El Valle de Antón, 800–1000 m., *Allen* 780. CHIRIQUÍ: upper Río Chiriquí Viejo, 1300–1900 m., *White & White* 37; vic. Finca Lérída, eastern slopes of Chiriquí Volcano, 5000 ft., *R. K. Morris* s. n.; vic. Bajo Mono and Quebrada Chiquero, 1500 m., *Woodson & Schery* 563; Bajo Mono-Robalo trail, western slopes of Cerro Horqueta, 5000–7000 ft., *Allen* 4783.

A common species of very variable vegetative habit, widely distributed throughout our area.

28. MAXILLARIA OREOCHARIS Schltr. in Fedde Rep. Sp. Nov. Beih. 17:69. 1922.

Erect or pendulous, epiphytic herbs. Pseudobulbs strongly ancipitous, oblong-elliptic, monophyllous, 3–4 cm. long and 1.0–1.5 cm. wide, approximate and often more or less imbricating, obliquely inserted on the rhizome, the bases provided with several imbricating bracts, the upper 1–3 of which are conspicuously long-foliateous, the short internodes enveloped in closely imbricating, more or less complanate, persistent, acute, papery bracts. Leaves subcoriaceous, linear, acute or acuminate, 25–40 cm. long and .6–1.0 cm. wide, contracted below into very short, conduplicate petioles. Inflorescences usually solitary, slender, 1-flowered scapes 3–4 cm. long, produced from the base of the mature pseudobulbs. Sepals subequal, free, more or less spreading, lanceolate, acute, white with red markings,

about 1.5 cm. long and .3-.4 cm. wide, the laterals adnate to the column foot, forming an inconspicuous, subacute mentum. Petals subequal to the dorsal sepal, lanceolate, acute, white, about 12 mm. long and 2.5-3 mm. wide. Lip oblong-ligular, acute, 3-lobed near the apex, about 12 mm. long and 5 mm. wide when spread out, the base articulated with the foot of the column, the lateral lobes erect in natural position, dark red, the mid-lobe ovate, subacute, somewhat thickened, about $\frac{1}{3}$ the total length of the lip, yellow, the upper surface and margins minutely papillose-puberulent; the disk with a linear, obtuse, fleshy callus, about $\frac{3}{4}$ the length of the lateral lobes. Column slender, semi-terete, somewhat arcuate, the apex dilated, about 7 mm. long, white, the base produced into a foot.

Costa Rica and Panama.

CHIRIQUÍ: without definite locality, 4000-5000 ft., *Powell 256*.

29. *MAXILLARIA PARVILABIA* Ames & Schweinf. in Sched. Orch. 8:62. 1925.

Erect, epiphytic herbs without pseudobulbs; the woody, often branching, cylindric canes 1-1.25 m. tall, the lower portions closely enveloped in the persistent leaf bases, the apices with 2-ranked foliage. Leaves coriaceous, linear-lanceolate, obtuse or retuse and obliquely 2-lobed at the apex, 4-15 cm. long and .6-1.2 cm. wide, the tubular, clasping bases closely imbricating and equidistantly distributed on the stems. Inflorescences few to many slender, 1-flowered scapes about 4 cm. long, produced singly or in loose fascicles from the leaf axils. Flowers pale yellow, of moderate size. Sepals subequal, free, spreading, lanceolate, acute, 1.6-2 cm. long and .4-.5 cm. wide, the laterals adnate to the foot of the column, forming a short, subacute mentum. Petals subequal to the dorsal sepal, elliptic-lanceolate, acute, 1.3-1.5 cm. long and .4-.5 cm. wide. Lip small, obscurely 3-lobed, elliptic-obovate, 5-6 mm. long and 3-3.5 mm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral margins somewhat erect in natural position, distinct only at the small acute apices, mid-lobe fleshy, ovate, acute, about $\frac{2}{5}$ the total length of the lip, the apex lightly recurved; the disk with a small fleshy linguiform callus, about $\frac{1}{2}$ the length of the lateral lobes. Column short, stout, semi-terete, about 2.5 mm. long, produced at the base into a short foot.

Costa Rica and Panama.

CHIRIQUÍ: vic. Bajo Chorro, in rain forest, headwaters of the Río Caldera, 6000 ft., *Davidson 126*.

30. *MAXILLARIA PITTIERI* (Ames) L. Wms. in Ann. Mo. Bot. Gard. 29:349. 1942.

Ornithidium Pittieri Ames, in Sched. Orch. 2:35. 1923.

Erect or pendulous, epiphytic herbs with woody, branching, cylindric canes up to about 1.5 m. tall, the lower portions naked or enveloped in the persistent, tubular leaf bases, the apex with sparse clusters of 2-ranked foliage, portions of which may persist at distant intervals along the stems. Leaves coriaceous, ligular, acute, 7-15 cm. long and 1-2 cm. wide, the conduplicate bases forming a sheathing

Fig. 184. *Maxillaria planicola*

(459)

petiole. Inflorescences short 1-flowered scapes, produced in dense fascicles from the axils of the leaves. Flowers small, pink. Sepals free, subequal, not spreading, concave, ovate, acute, with a central keel, 8–9 mm. long and about 4 mm. wide, the laterals adnate to the somewhat produced base of the column, forming a short, rounded mentum. Petals subequal to the dorsal sepal, concave, oblong-ovate, acute, 7 mm. long and about 3 mm. wide. Lip fleshy, entire, about 4 mm. long and 2.5 mm. wide, the base deeply concave and adnate to the base of the column, the apex lanceolate, obtuse to subacute, conspicuously thickened. Column short, stout, about 2.5 mm. long, the base with conspicuous lateral thickenings.

Costa Rica and Panama.

CHIRIQUÍ: Bajo Chorro, in rain forest, headwaters of the Río Caldera, 6000 ft., Davidson 117.

31. MAXILLARIA PLANICOLA C. Schweinf. in Bot. Mus. Leaflet Harv. Univ. 8:188. 1940.

Camaridium latifolium Schltr. in Fedde, Rep. Sp. Nov. Beih. 17:74. 1922, non *Maxillaria latifolia* Lindl.

Epiphytic herbs with elliptic-ovate to elliptic-oblong, compressed, monophyllous pseudobulbs 3.5–6 cm. long and 1.5–4 cm. wide, the internodes of the mature plants 6–8 cm. long and 8–12 mm. thick, enveloped in closely imbricating, tubular, acute, papery bracts, the upper 3–6 of which are complanate-spathaceous, the conduplicate bases covering the lower half of the pseudobulb. Leaves coriaceous, ligular to elliptic-lanceolate, acute, 15–35 cm. long and 3–6 cm. wide, contracted below into narrow, conduplicate petioles. Inflorescences usually 2–4 slender 1-flowered scapes, 4–5 cm. long, produced from the axils of the spathaceous, sheathing bracts after the current pseudobulb has nearly matured. Flowers relatively large and conspicuous. Sepals subequal, free, not spreading, concave, the dorsal sepal lanceolate, acute, 3–3.5 cm. long and .8–1.0 cm. wide, the laterals elliptic-lanceolate, acute, 3–3.5 cm. long and 1.0–1.2 cm. wide, adnate to the foot of the column, forming an inconspicuous, rounded mentum. Petals white, lanceolate, acute, 2.8–3.2 cm. long and .6–.7 cm. wide. Lip conspicuously 3-lobed, white, 18–20 mm. long and 18–20 mm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes erect and incurving over the column in natural position, the acute apices projecting, the mid-lobe triangular, acute, about $\frac{1}{3}$ the total length of the lip; the disk with a short, fleshy, ligular, obtuse callus about $\frac{3}{4}$ the length of the lateral lobes, the basal half yellow, densely and conspicuously pilose. Column semi-terete, somewhat arcuate, 10–12 mm. long, produced at the base into a short foot.

Panama.

CANAL ZONE: vic. San Juan de Pequéní, upper Madden Lake region, Powell 3438; vic. Vigía and San Juan de Pequéní, 66 m., Dodge, Steyermark & Allen 16580. PANAMÁ: hills east of Panama City, Powell 8; Cerro Campana, vic. Campana, on sheer rock face, 2500 ft., Allen 5078. COLÓN: vic. Porto Bello, sea level, Powell 3458.

32. *MAXILLARIA POWELLII* Schltr. in Fedde Rep. Sp. Nov. Beih. 17:70. 1922.

Erect, epiphytic herbs with approximate, fleshy, ovoid to elliptic-ovoid, compressed, monophyllous pseudobulbs 2-4 cm. long and 1.5-2 cm. wide, the bases enveloped in several papery, imbricating bracts which often weather away to loose fibers. Leaves coriaceous, ligular, obtuse to subacute, 15-40 cm. long and 2-3 cm. wide, contracted below into slender, conduplicate petioles. Inflorescences usually 2-4 slender, 1-flowered scapes 4-6 cm. long, produced from the bases of the pseudobulbs. Flowers of moderate size. Sepals subequal, free, spreading, yellow or tan, the dorsal sepal concave, 1.5-1.8 cm. long and .4-.6 cm. wide, ligular to elliptic-lanceolate, obtuse, with a minute apicule, the laterals ligular to elliptic-lanceolate, obtuse, 1.8-2 cm. long and .4-.8 cm. wide, the oblique bases adnate to the foot of the column forming a short, subacute mentum. Petals subequal to the dorsal sepal, yellow or tan, rather obliquely ligular, acute, 1.5-1.7 cm. long and .4-.5 cm. wide. Lip conspicuously 3-lobed near the apex, 1.4-1.6 cm. long and .7-.8 cm. wide when spread out, contracted at the base and articulated with the foot of the column, the lateral lobes yellow or tan, erect in natural position, the acute to obtuse apices projecting, the mid-lobe ovate, acute, fleshy, rugulose, minutely pilose, usually reddish brown, about $\frac{1}{3}$ the total length of the lip, the under-surface of the apex with a triangular keel; the disk with a low, ligular callus about $\frac{3}{4}$ the length of the lateral lobes. Column semi-terete, somewhat arcuate, 7-8 mm. long, produced at the base into a foot. Anther terminal, operculate, incumbent, 1-celled.

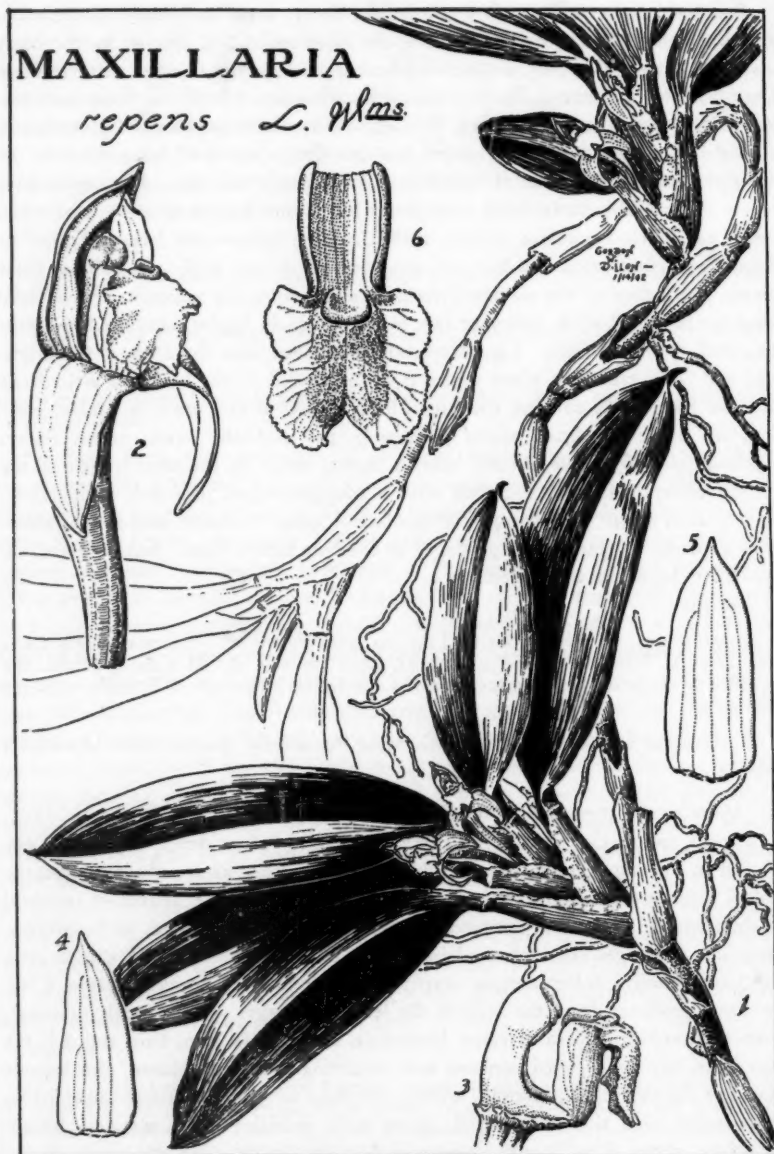
Panama.

CANAL ZONE: vic. Frijoles, Gatún Lake, sea level, Powell 28. PANAMÁ: Cerro Campana, 2400 ft., Allen & Fairchild 3973, 4235, 4237. COCLÉ: vic. El Valle de Antón, 600 m., Allen 2073; mossy forest on the crest of Cerro Pajita, hills north of El Valle, 1200 m., Allen 4254.

A common small-flowered species, rather doubtfully distinct from *Maxillaria ringens*.

33. *MAXILLARIA REPENS* L. Wms. in Amer. Orch. Soc. Bull. 10:273, t. 9. 1942.

Repent, epiphytic herbs with elongate, slender, often branching stems enveloped in tubular, papery sheaths which often weather away, the caespitose 2-ranked foliaceous growths usually freely rooting from the base, distant or terminal on the stems. Leaves 3-5, coriaceous, 3-10 cm. long and 1-2 cm. wide, elliptic-lanceolate, acute, the conduplicate bases closely imbricating, forming a complanate, sheathing petiole. Inflorescences usually several slender, 1-flowered scapes 1.5-2 cm. long, produced from the axils of the leaves. Flowers small. Sepals subequal, green with reddish brown margins, lanceolate, acute, 7-10 mm. long and 2.5-3.5 mm. wide, the dorsal sepal concave and incurving over the column, the laterals adnate to the foot of the column, widely spreading or reflexed. Petals subequal to and parallel with the dorsal sepal, green with reddish brown margins, linear-lanceolate, acute, 6.5-7.5 mm. long and 2-3 mm. wide. Lip conspicuously 3-

Fig. 185. *Maxillaria repens*

lobed, 6-8 mm. long and 3.5-4.5 mm. wide, the basal half canaliculate and adnate to the foot of the column, the lateral lobes erect and parallel with the column, the area between the truncate apices with a short, obtuse, concave, fleshy callus; the mid-lobe broadly spreading, subquadrate, strongly reflexed, the truncate apex deeply emarginate, the center orange-yellow with pale yellow, undulate margins, the under-surface with a short, fleshy, apiculate keel. Column stout, semi-terete, about 5 mm. long, produced at the base into a short, stout foot.

Panama.

COCLÉ: region north of El Valle de Antón, trail to Las Minas, 1000 m., *Allen 2868*; mossy forest on the crest of Cerro Pajita, hills north of El Valle, 1200 m., *Allen & Fairchild 3946*, *Allen & Allen 3792*.

34. *MAXILLARIA RINGENS* Rchb. f. in Walp. Ann. 6:523. 1863.

Maxillaria Tuerckheimii Schltr. in Fedde Rep. Sp. Nov. 10:295. 1912.

Maxillaria Rousseauae Schltr. in Beih. Bot. Centralbl. 36²:413. 1918.

Maxillaria pubilabia Schltr. in Fedde Rep. Sp. Nov. Beih. 17:71. 1922.

Maxillaria Amparoana Schltr. loc. cit. 19:54. 1923.

Maxillaria Brenesii Schltr. loc. cit. 231. 1923.

Maxillaria lactea Schltr. loc. cit. 233. 1923.

Erect, epiphytic herbs with fleshy, approximate, elliptic-ovoid, compressed, monophyllous pseudobulbs 2.5-5.5 cm. long and 2-3 cm. wide, the bases enveloped in several papery, imbricating bracts which become more or less fibrous with age. Leaves coriaceous, ligular, obtuse to acute, 15-40 cm. long and 2-4.5 cm. wide, contracted below into short or elongate, conduplicate petioles. Inflorescences 1 to about 6 slender, 1-flowered scapes 5-12 cm. long, produced singly or in loose fascicles from the bases of the pseudobulbs. Flowers relatively large. Sepals free, subequal, spreading, yellow, white, or tan, sometimes shaded pink or lavender, ligular, obtuse to lanceolate, acuminate, 2.5-4 cm. long and .3-.6 cm. wide, the laterals adnate to the column foot, forming a short, rounded or subacute mentum. Petals subequal to the dorsal sepal, white or pale yellow, lanceolate, acute to acuminate, 2.2-3.5 cm. long and .25-.4 cm. wide. Lip 3-lobed near the apex, 10-15 mm. long and 6-8 mm. wide when spread out, white marked with lavender to yellow marked maroon, contracted at the base and articulated with the column foot, the lateral lobes erect, the obtuse to acute apices projecting, the mid-lobe rhombic-ovate to obovate, obtuse to acute, fleshy and more or less rugose or minutely papillose on the upper surface, about $\frac{1}{3}$ the total length of the lip, the under-surface of the apex transversely thickened or with an acute central keel; the disk with a ligular callus about $\frac{3}{4}$ the length of the lateral lobes. Column semi-terete, somewhat arcuate, about equaling the lateral lobes of the lip, the base produced into a short foot.

Mexico, British Honduras, Guatemala, Honduras, Nicaragua, Costa Rica, Panama to Peru.

COCLÉ: region north of El Valle de Antón, 800-1000 m., *Allen 2264*, *2871*, *2873*;

mountains beyond La Pintada, 400-600 m., *Hunter & Allen 560*. CHIRIQUÍ: without definite locality, 4000 ft., *Powell 3443, 3466*.

A common, very variable species, widely distributed throughout the intermediate highlands of central and northern South America.

35. *MAXILLARIA RUFESCENS* Lindl. in Bot. Reg. 21: sub *t.* 1802. 1836.

Maxillaria Abelei Schltr. in Fedde Rep. Sp. Nov. Beih. 9:101. 1921.

Erect, epiphytic herbs with approximate, ovoid-elliptic to linear, compressed, fleshy, monophyllous pseudobulbs 2.5-4.5 cm. long and 6-22 mm. wide, the bases enveloped in several papery, imbricating bracts which become fibrous with age. Leaves coriaceous, ligular, acute or rarely acuminate, 15-32 cm. long and 1.2-3.5 cm. wide, contracted below into short or elongate, conduplicate petioles. Inflorescences slender, usually solitary, 1-flowered scapes 3.5-4 cm. long, produced from the bases of the pseudobulbs. Flowers of moderate size. Sepals subequal, free, spreading, creamy white or yellow, elliptic-oblong, obtuse to subacute, 1.4-2 cm. long and .5-.7 cm. wide, the laterals adnate to the foot of the column, forming a short, rounded mentum. Petals subequal to the dorsal sepal, white or yellow, elliptic-lanceolate, obtuse to shortly acute, 12-15 mm. long and 5-7 mm. wide. Lip conspicuously 3-lobed, orange to yellow with reddish brown or purple markings, 10-12 mm. long and 5-6 mm. wide when spread out, the base contracted and articulated with the column foot, the lateral lobes erect in natural position, the acute apices conspicuously projecting, the mid-lobe broadly oblong, about $\frac{3}{5}$ the total length of the lip, the truncate apex usually emarginate; the disk with a fleshy, ligular callus equaling or exceeding the lateral lobes in length. Column stout, somewhat arcuate, semi-terete, 10-12 mm. long, the base produced into a short foot.

Guatemala, Honduras, Nicaragua, Costa Rica, Panama, British Guiana, Peru, Brazil, Cuba, Hispaniola, Jamaica, Trinidad, and probably other adjacent areas.

COCLÉ: mountains beyond La Pintada, 400-600 m., *Hunter & Allen 563*; vic. El Valle de Antón, 600-1000 m., *Allen 1255*.

36. *MAXILLARIA UMBRATILIS* L. Wms. in Ann. Mo. Bot. Gard. 28:425. 1941.

Camariidium nutantiflorum Schltr. in Beih. Bot. Centralbl. 36²:417. 1918, non *Maxillaria nutantiflora* Schltr.

Erect or pendulous, epiphytic herbs with elongate, sometimes branching stems. Pseudobulbs elliptic-ovoid, ancipitous, monophyllous, 2.5-4 cm. long and 1.5-2 cm. wide, very distantly and obliquely inserted on the canes, the lower half covered by the conduplicate bases of the 3-5 long-foliaceous bracts; the long internodes naked or enveloped in the persistent bases of the imbricating bracts. Leaves of the apex of the pseudobulb and those of the basal long-foliaceous bracts subcoriaceous, ligular, acute or obtuse, 8-30 cm. long and 1.2-2.2 cm. wide. Inflorescences slender, 1-flowered scapes 3-5 cm. long, produced from the bract axils of the elongate, complanate flush of new growth. Flowers of moderate size. Sepals

free, subequal, spreading, yellowish green, lanceolate, acute, 2-2.5 cm. long and 4-6 mm. wide, the laterals adnate to the foot of the column, forming a short, rounded mentum. Petals subequal to the dorsal sepal and similarly colored, obliquely lanceolate, acute to acuminate, 15-18 mm. long and 3.5-5 mm. wide. Lip conspicuously 3-lobed, red or marked with red, 10-12 mm. long and 10-12 mm. wide when spread out, the base contracted and articulated with the foot of the column, the lateral lobes subfalcate, acute, erect in natural position and somewhat incurving over the column, the apices projecting, the mid-lobe ovate, acute, about $\frac{1}{2}$ the total length of the lip; disk with a short, broad, truncate, fleshy callus about $\frac{1}{3}$ the length of the lateral lobes. Column very short, stout, about 5 mm. long, produced at the base into a short foot.

Costa Rica and Panama.

CHIRIQUÍ: vic. Bajo Chorro, headwaters of the Río Caldera, in rain forest, 6000 ft., Davidson 308.

37. *MAXILLARIA UNCATA* Lindl. in Bot. Reg. 23: sub t. 1986. 1837.

Maxillaria Macleanii Batem. ex Lindl. in Bot. Reg. 26: Misc. 70. 1840.

Maxillaria stenostele Schltr. in Beih. Bot. Centralbl. 36²:414. 1918.

Slender, erect or pendulous, epiphytic herbs with short to elongate, often branching stems 4-40 cm. long. Pseudobulbs minute, linear-complanate to terete, monophyllous, 4-10 mm. long and 2-3.5 mm. wide, approximate to rather remote, obliquely inserted on the stems, pseudobulbs and internodes enveloped in broad, brown, imbricating, scarious sheaths. Leaves fleshy, subulate-conduplicate, semiterete or rarely lanceolate-elliptic, acute to acuminate, 2-6 cm. long and .2-1.0 cm. wide. Inflorescences short, usually solitary, 1-flowered scapes 10-20 mm. long, produced from the base of the current mature growth. Flowers small, translucent with red or purple stripes. Sepals free, not spreading, the dorsal sepal oblong, obtuse to acute, concave, 7-9 mm. long and about 3 mm. wide, the laterals lanceolate, acute, 10-12 mm. long and 3-4 mm. wide, the very long, oblique bases adnate to the foot of the column, forming an elongate, conspicuous, obtuse to subacute mentum. Petals ligular to oblanceolate, acute, about equaling the dorsal sepal in length. Lip linear-oblanceolate, obtuse to subacute, entire, somewhat exceeding the lateral sepals, 12-14 mm. long and 3-3.5 mm. wide at the apex, the long narrow base slightly concave and articulated with the foot of the column, the subrotund to subacute apex often with undulate margins; the disk with a linear, obtuse callus about $\frac{1}{2}$ the total length of the lip. Column elongate, semiterete, somewhat arcuate, the apex with short, lateral, subfalcate, deflexed wings; the base produced into an elongate foot.

British Honduras, Guatemala, Honduras, Costa Rica, Panama, Peru, British Guiana, Brazil, and probably adjacent areas.

CANAL ZONE: Río Pequeni, upper Madden Lake region, 66-70 m., Dodge, Stryermark & Allen 16752. PANAMÁ: hills east of Panama City, sea level to about 200 ft., Powell 120. COLÓN: Quebrada López, lower forested slopes of Cerro Santa Rita, about 30 m., Allen 2141. COCLÉ: hills north of El Valle de Antón, 600-1000 m., Allen 1682, 3715. BOCAS DEL TORO: without definite locality, von Wedel 489.

38. *MAXILLARIA VAGANS* Ames & Schweinf. in Sched. Orch. 8:65. 1925.

Erect or pendulous, epiphytic herbs with stout, simple or branching stems 15–45 cm. long, the lower portions usually conspicuously enveloped in numerous fibrous roots. Pseudobulbs fleshy, monophyllous, elliptic-oblong, compressed and rugose, 1.5–3 cm. long and 1.0–1.5 cm. wide, approximate or distant, inserted at an acute angle on the stems, the current pseudobulb partly covered by the conduplicate bases of several long-foliaceous bracts, the internodes and old pseudobulbs entirely invested by the persistent bract bases. Leaves of the apex of the pseudobulbs and the blades of the foliaceous bracts coriaceous, ligular, obtuse, or the apex retuse and unequally bilobed, 4.5–18 cm. long and 1–2.5 cm. wide. Inflorescences slender, 1-flowered scapes 3–4 cm. long, usually produced from the base of the current mature pseudobulb but sometimes from the axils of the flush of new growth. Flowers of moderate size. Sepals free, spreading, red or pink with yellow or green margins, the dorsal sepal linear-lanceolate to elliptic-lanceolate, acute, arching over the column, 1.7–2.3 cm. long and .5–.7 cm. wide, the dorsal surface with a keel which terminates in an apicule, the lateral sepals spreading, elliptic-lanceolate, acute, 1.8–2.2 cm. long and .5–.7 cm. wide, adnate at the base to the column foot, forming a short, rounded mentum. Petals ligular to oblanceolate, acute, similarly colored with the sepals, 1.5–2 cm. long and .5–.6 cm. wide. Lip conspicuously 3-lobed, red margined white, or yellow with the apical lobe spotted rose-pink, 12–16 mm. long and 6–8 mm. wide, contracted at the base and articulated with the foot of the column, the lateral lobes rounded, erect in natural position, the mid-lobe fleshy, obovate, acute, canaliculate, with ascending margins, more than half the total length of the lip, the lower surface with a strongly developed keel; disk with a short, fleshy, emarginate callus. Column semi-terete, somewhat arcuate, 6–8 mm. long, produced at the base into a short foot. Anther terminal, operculate, incumbent, 1-celled.

Costa Rica and Panama.

COCLÉ: mountains beyond La Pintada, 400–600 m., *Hunter & Allen 598*; region north of El Valle de Antón, trail to Las Minas, 1000 m., *Allen 2893*; mossy forest on crest of Cerro Pajita, hills north of El Valle, 1000 m., *Allen 4177*. CHIRIQUÍ: Palo Alto, 4500–5000 ft., *Powell 348*.

A fairly frequent highland species closely allied to *Maxillaria cucullata*.

39. *MAXILLARIA VALENZUELANA* (A. Rich.) Nash, in Bull. Torr. Bot. Club. 34:121. 1907.

Dicrypta iridifolia Batem. in Loud. Hort. Brit. Suppl. 2:630. 1839, nomen nudum. *Pleurothallis valenzuelana* A. Rich. in Sagra, Hist. Isla Cuba 11 [Fl. Cub. Fanerog.]:234. 1850.

Maxillaria iridifolia (Batem.) Rchb. f. in Bonplandia 2:16. 1854.

Dicrypta irisphyta Barb. Rodr. Gen. & Spec. Orch. 1:126. 1877.

Pendulous epiphytic herbs without pseudobulbs. Leaves distichously arranged in the form of a broad fan, rather fleshy, gladiate, lanceolate, acuminate, 9–30 cm. long and 1.0–2.5 cm. wide, the broad conduplicate bases closely imbricating. In-

florescences short, 1-flowered scapes, solitary or in dense fascicles in the axils of the leaves. Flowers of moderate size. Sepals free, subequal, spreading, yellow, elliptic-lanceolate, acute, 10–12 mm. long and 4–6 mm. wide, the laterals somewhat oblique, the bases adnate to the column foot, forming an inconspicuous, rounded mentum. Petals lanceolate, acute, yellow, 8–10 mm. long and 2.5–3.5 mm. wide. Lip entire or obscurely 3-lobed, yellow with purple or maroon markings, elliptic-ovate, acute, 9–11 mm. long and 4–5 mm. wide when spread out, the base contracted and articulated with the column foot, the lateral margins erect in natural position, the mid-lobe thickened at the apex and on the margins, about $\frac{1}{2}$ the total length of the lip; disk with a ligular callus running the full length of the lip, somewhat thickened near the apices of lateral margins. Column short, stout, somewhat arcuate, produced at the base into a short foot.

Cuba, Honduras, Costa Rica, Panama, Colombia, Venezuela, Brazil, and probably adjacent areas.

CHIRIQUÍ: vic. Boquete, 3800 ft., *Davidson 636*.

A frequent, pendulous, fan-leaved epiphyte of the Chiriquí highlands.

40. *MAXILLARIA VARIABILIS* Batem. ex Lindl. in Bot. Reg. 23: sub t. 1986. 1837.

Maxillaria Henchmanni Hook. in Bot. Mag. t. 3614. 1837.

Maxillaria angustifolia Hook. Ic. Plant. 4: t. 348. 1841.

Maxillaria Lyonii Lindl. in Bot. Reg. n. s. 8: Misc. 17. 1845.

Maxillaria revoluta Kl. in Allgem. Gartenzeit. 20:186. 1852.

Maxillaria chiriquensis Schltr. in Fedde Rep. Sp. Nov. Beih. 17:68. 1922.

Maxillaria panamensis Schltr. loc. cit. 70. 1922.

Maxillaria costaricensis Schltr. loc. cit. 19:232. 1923.

Erect or pendulous, epiphytic herbs with short or elongate, usually simple stems of very variable vegetative appearance, 5–30 cm. long. Pseudobulbs linear to elliptic-oblong, subcylindric to strongly ancipitous, usually rugose, 1.5–6 cm. long and .3–2.0 cm. wide, approximate and inserted at an acute angle on the stems, the truncate apices monophyllous, the internodes and bases enveloped in closely imbricating, papery bracts. Leaves coriaceous, ligular, obtuse or 2-lobed at the apex, 3–15 cm. long and .3–1.6 cm. wide, contracted below into very short, conduplicate petioles. Inflorescences slender, 1-flowered, often solitary scapes produced from the bract axils of the flush of new growth, or sometimes from the base of the current mature pseudobulb. Flowers usually of moderate size or small, white or yellow marked with dark red, or with a red lip, or entirely dark red. Sepals subequal, free, more or less spreading, linear-lanceolate to elliptic-lanceolate, obtuse, with a minute apicule or sometimes acute, 6–12 mm. long and 2–4 mm. wide, the laterals adnate to the foot of the column, forming a short, subacute mentum. Petals lanceolate to oblanceolate, acute, 5–10 mm. long and 1.5–3.5 mm. wide. Lip entire or obscurely 3-lobed near the apex, 6–12 mm. long and 3–6 mm. wide when spread out, the base articulated with the column foot, the lateral margins rounded and erect in natural position, the mid-lobe subacute to truncate and

shallowly emarginate, about $\frac{1}{3}$ the total length of the lip; the disk with a ligular, obtuse callus nearly equalling the lateral lobes. Anther terminal, operculate, incumbent, 1-celled.

Mexico, British Honduras, Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, Panama, British Guiana, and probably adjacent territories.

PANAMÁ: hills near Panama City, sea level, *Powell 124*. COCLÉ: vic. El Valle de Antón, 600–1000 m., *Allen 1252, 3716, 3813*. CHIRIQUÍ: without definite locality, 4000 ft., *Powell 125*; vic. Boquete, 4000–4500 ft., *Powell 418*; Cerro de Lino, vic. Boquete, 1000–1300 m., *Pittier 3017*; vic. Boquete, 3800 ft., *Davidson 645*; vic. Monte Lirio, upper Río Chiriquí Viejo, *G. White 38*; vic. New Switzerland, Río Chiriquí Viejo, 1800–2000 m., *Allen 1339*.

41. MAXILLARIA WERCKLEI (Schltr.) L. Wms. in Ann. Mo. Bot. Gard. 27:284. 1940.

Ornithidium Wercklei Schltr. in Fedde Rep. Sp. Nov. Beih. 19:60. 1923.

Maxillaria aurantiaca Schltr. loc. cit. 27:87. 1924.

Maxillaria Lankesteri Ames, in Sched. Orch. 7:11. 1924.

Erect or pendulous, epiphytic herbs with slender, branching stems 3–20 cm. tall. Pseudobulbs linear, compressed, rugose in dried specimens, 4–25 mm. long and 1.5–5 mm. wide, distantly inserted on the stems, the truncate apices monophyllous, the bases with 2–3 conspicuous, long-foliateous bracts, the long internodes enveloped in persistent, closely imbricating, complanate sheaths. Leaves of the apex of the pseudobulbs and the blades of the foliateous bracts coriaceous, ligular to elliptic-lanceolate, broadly obtuse, or retuse at the apex, 1–3 cm. long and .2–1.2 cm. wide, contracted below into very short, subsessile, conduplicate petioles. Inflorescences slender, 1-flowered scapes 4–10 mm. long, produced from the bract axils of the flush of new growth. Flowers very variable, small or of moderate size, usually tan striped red or brown to dark reddish purple. Sepals subequal, free, spreading, lanceolate to elliptic-lanceolate, acute, 5–12 mm. long and 2.5–5 mm. wide, the apices sometimes carinate, the laterals adnate to the foot of the column, forming a short, rounded mentum. Petals subequal to the dorsal sepal, oblong-lanceolate, obtuse to subacute, 4–11 mm. long and 2–4 mm. wide. Lip 3-lobed near the base, 4–10 mm. long and 3–6 mm. wide, contracted at the base and articulated with the column foot, the short, lateral lobes rounded or subacute, obliquely erect in natural position, separated near the apices by a transverse, fleshy callus, mid-lobe elliptic-ovate to oblong, convex, the margins often deflexed or revolute, the apex obtuse to subacute, $\frac{3}{5}$ to $\frac{3}{4}$ the total length of the lip. Column short, stout, semi-terete, somewhat arcuate, produced at the base into a distinct foot. Anther terminal, operculate, incumbent, 1-celled.

Costa Rica, Panama, and Colombia.

COCLÉ: hills north of El Valle de Antón, 1000 m., *Allen 1253*.

(To be concluded in Part III, Fasc. 5)

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